

The copyright of this thesis vests in the author. No quotation from it or information derived from it is to be published without full acknowledgement of the source. The thesis is to be used for private study or non-commercial research purposes only.

Published by the University of Cape Town (UCT) in terms of the non-exclusive license granted to UCT by the author.



**UNIVERSITY OF CAPE TOWN  
FACULTY OF COMMERCE**

**DISCLOSURE LEVEL AND THE COST OF  
EQUITY CAPITAL: SOUTH AFRICAN EVIDENCE**

**A Research Dissertation presented to the Faculty of Commerce in  
fulfilment for the Degree of Master in Commerce.**

**Presented by: Charlene Swartz**

**Supervisor: Mark Graham**

## PLAGIARISM DECLARATION

1. I acknowledge that plagiarism is wrong.
2. Each significant contribution to and quotation in this report from the work or works of other people has been attributed, cited and referenced.
3. This report is my own work.
4. I have not allowed, and will not allow, anyone to copy this report with the intention of passing it off as his or her own work.

Signature: \_\_\_\_\_

Name: Charlene Swartz

Date:

## SYNOPSIS

This study investigates the hypothesis of a negative relationship between the level of disclosure and the cost of equity capital, for the top 100 companies on the South African JSE Securities Exchange for the period 1999 to 2003.

Previous studies indicate the reason for this relationship is as a result of imbalances of information (information asymmetry) available to various parties, which can arise when a firm possesses certain valuable information that has not yet been publicly disclosed. This private information has however become known to a few select investors. The uninformed investor will therefore consequently demand a higher return to protect them against this information risk. The effect of information asymmetry can effect the cost of equity capital in the following two ways: (1) increasing disclosure, could result in an increase in the liquidity of a company's share and consequently a decrease in the premium demanded for the share, (2) increased disclosure reduces the information gap between a company's management and investors, thereby reducing the uncertainty in the market and in turn will reduce cost of equity capital. Both the above effects indicate that by increasing disclosure levels, the cost of equity capital could be reduced.

In testing the above hypothesis this study adopts a direct method of testing, which involves estimating the cost of equity capital for each firm in the sample and determining the hypothesised relationship with the firm's respective disclosure level. Past studies have found that a firm's cost of equity capital is dependent on four main variables, namely beta, firm size, leverage and disclosure levels. Based on the prior findings the following independent variables have been included in the model tested: firstly, the systematic risk of a firm, which represents the risks specific to that particular firm. This is represented by the market beta of a firm. Secondly, the size of the firm indicated by the market capitalisation of the firm. The third variable is the level

of debt in the firm, which is indicated by the leverage of a firm. Lastly, the level of disclosure will influence the cost of equity capital and this is indicated by a ranked disclosure score.

The hypothesised relationship is tested for the overall disclosure scores and for each individual disclosure category making up the overall disclosure score. To ensure the robustness of the findings the following sensitivity tests are also conducted: using alternative disclosure scores, fractional ranks for all variables, each year end tested separately, each company year end tested separately, each sector tested separately and different measure for the cost of equity capital.

The hypothesised relationship showed no significant relationship for the overall disclosure score as well as for the four disclosure categories. Confirming this finding the sensitivity testing using the alternative disclosure scores, different company year ends, different industry sectors and the CAPM model for cost of equity capital also resulted in a statistically insignificant relationship. However, the results from the individual years in the sample resulted in an interesting result. For the early years a positive relationship was found, where as for the last two years a negative association was found

The results from the study therefore indicate that there is a definite change in the hypothesised relationship in the South African market over the years examined in the sample. One reason for this could be due to the increase in focus on corporate governance disclosure which is now required by the JSE Securities exchange and the increase in focus on environmental disclosure. This could indicate that investors consider disclosure of a firm's corporate governance procedures and practices in assessing the risk levels of a firm. However, taking all the regression analysis results into account, the overall conclusion for this study is that there is no significant relationship, either positive or negative, between the cost of equity capital and the disclosure levels for the top 100 companies on the JSE for the five year time period analysed.

# TABLE OF CONTENTS

<b>PLAGIARISM DECLARATION</b>	<b><i>i</i></b>
<b>SYNOPSIS</b>	<b><i>ii</i></b>
<b>LIST OF TABLES</b>	<b><i>vii</i></b>
<b>LIST OF DIAGRAMS</b>	<b><i>vii</i></b>
<b>1. INTRODUCTION</b>	<b><i>1</i></b>
1.1. BACKGROUND	<b>1</b>
1.2. MOTIVATION FOR RESEARCH	<b>4</b>
1.3. RESEARCH OBJECTIVES	<b>4</b>
1.4. LIMITATIONS	<b>5</b>
1.5. ASSUMPTIONS	<b>6</b>
1.6. STRUCTURE OF THESIS	<b>6</b>
<b>2. LITERATURE REVIEW</b>	<b><i>7</i></b>
2.1. THE ROLE OF DISCLOSURE IN CAPITAL MARKETS	<b>8</b>
2.2. REGULATION OF DISCLOSURE AND FINANCIAL REPORTING	<b>9</b>
2.3. DISCLOSURE LITERATURE	<b>12</b>
2.4. PRIVATE AND PUBLIC INFORMATION	<b>13</b>
2.4.1. Private Information	<b>14</b>
2.4.2. Public Information	<b>14</b>
2.5. REPORTING AND DISCLOSURE EFFECTS OF PUBLIC INFORMATION ON CAPITAL MARKETS	<b>15</b>
2.5.1. Positive accounting theory	<b>15</b>
2.5.2. Voluntary disclosure literature	<b>16</b>
2.5.2.1. Improved Liquidity	<b>17</b>
2.5.2.2. Increased number of analysts	<b>18</b>
2.5.2.3. Reduced cost of capital	<b>18</b>
2.6. DISCLOSURE EFFECTS ON THE COST OF CAPITAL	<b>19</b>
2.6.1. Information asymmetry and the cost of capital	<b>21</b>
2.6.2. Arguments against disclosure effects	<b>22</b>
2.6.3. Research of disclosure effects	<b>23</b>
2.7. INDIRECT TESTING	<b>24</b>
2.7.1. Bid-ask spreads	<b>24</b>
2.7.2. Trade volume and share price volatility	<b>26</b>
2.7.3. Probability of Informed Trade (PIN)	<b>27</b>
2.7.4. Beta and Total Risk of a Firm	<b>28</b>
2.7.5. South African evidence of a negative association between the level of disclosure and the Cost of Capital	<b>29</b>
2.8. DIRECT TESTING	<b>30</b>
2.8.1. Cost of Debt	<b>30</b>
2.8.2. Cost of Equity Capital	<b>31</b>

2.8.3. South African evidence of a negative association between the level of disclosure and the Cost of Equity Capital	33
<b>3. METHODOLOGY</b>	<b>34</b>
3.1. HYPOTHESIS DEVELOPMENT AND RESEARCH DESIGN	34
3.1.1. Hypothesis Development	34
3.1.2. The Model	36
3.2. DEPENDANT VARIABLE: THE COST OF EQUITY CAPITAL	37
3.2.1. Average realised returns	37
3.2.2. Capital Asset Pricing Model (CAPM)	38
3.2.3. Earnings-to-price ratio	39
3.2.4. Residual Income Model	39
3.3. INDEPENDENT VARIABLE: QUALITY OF DISCLOSURE	44
3.4. INDEPENDENT VARIABLES: MARKET BETA	47
3.5. INDEPENDENT VARIABLES: FIRM SIZE	49
3.6. INDEPENDENT VARIABLES: FINANCIAL LEVERAGE	50
3.7. SAMPLE SELECTION	50
3.8. DATA	51
3.8.1. Dependent Variable: Cost of Equity Capital	51
3.8.2. Independent Variables	52
3.8.2.1. Disclosure Scores	52
3.8.2.2. Beta values, Market Capitalisation and Financial Leverage	54
3.9. MAIN HYPOTHESIS TEST	55
3.10. DIAGNOSTIC TESTING	56
3.11. TESTING VALIDITY OF VARIABLES	59
3.11.1. Test validity of Cost of Equity Capital	59
3.11.2. Test validity of Disclosure Scores	61
3.12. ALTERNATIVE TESTING	62
3.12.1. Simultaneity Problem	62
3.12.2. Use of alternative measures for the disclosure scores	63
3.12.3. Use of Fractional Ranks for all variables	64
3.12.4. Regression Analysis for each year	64
3.12.5. Regression Analysis according to Company Year End	64
3.12.6. Regression Analysis according to Industry Sector	64
3.12.7. CAPM as an estimate for the Cost of Equity Capital	65
<b>4. EMPIRICAL RESULTS</b>	<b>67</b>
4.1. DESCRIPTIVE STATISTICS AND CORRELATION ANALYSIS	68
4.2. VALIDITY TESTING OF VARIABLES	70
4.2.1. Disclosure Scores	70
4.2.2. Cost of Equity Capital	73
4.3. EMPIRICAL ANALYSIS OF HYPOTHESIS ONE	77
4.4. EMPIRICAL ANALYSIS OF HYPOTHESIS TWO	83
4.5. ALTERNATIVE TESTING	86
4.5.1. Simultaneity Problem	86
4.5.2. Alternative Disclosure Score Measures	88
4.5.3. Use of Fractional Ranks for all variables	90

4.5.4.	Regression analysis for each year	92
4.5.5.	Regression Analysis according to Company Year End	94
4.5.6.	Regression Analysis according to Industry Sector	95
4.5.7.	CAPM Estimate of the Cost of Equity Capital	96
<b>4.6.</b>	<b>SUMMARY OF EMPIRICAL RESULTS</b>	<b>98</b>
<b>5.</b>	<b>CONCLUSION</b>	<b>99</b>
	<b>REFERENCES</b>	<b>103</b>

University of Cape Town



## LIST OF TABLES

		Page
1.	Derivation of Sample Size_____	67
2.	Summary Statistics and Variable Definitions_____	68
3.	Pearson Correlation Coefficients_____	69
4.	Regression of DRANK an Average return on equity, Market Value Leverage and Exchange Listing status_____	72
5.	Regression of COE on Beta, Market Value and Leverage_____	75
6.	Regression of COE on Beta, Market Value, Leverage and Fractional Disclosure Rank_____	79
7.	Year of Observation Dummy Variable Regression Coefficients_____	82
8.	Regression of COE on Beat, Market Value, Leverage and the Four Categories of the Total Disclosure Score_____	85
9.	Two-Stage Regression COE on Beta, Market Value, Leverage and Predicted Disclosure Rank_____	87
10.	Alternative disclosure measures_____	90
11.	Ranked Regression Analysis_____	91
12.	Regression Analysis for each year_____	92
13.	Regression Analysis per company year end_____	95
14.	Regression Analysis per industry sector_____	96
15.	CAPM Regression Analysis_____	97
16.	Summary of COE Regression Analysis Results_____	98

## LIST OF DIAGRAMS

		Page
1.	Disclosure Literature – streams of research_____	12
2.	The effect of increased disclosure on Cost of Capital_____	19

# 1. INTRODUCTION

## 1.1. BACKGROUND

This study investigates the relationship between the level of financial disclosure and the cost of equity capital for the top 100 companies on the JSE Securities Exchange for the period 1999 to 2003. Prior research of the relationship between a company's cost of capital and disclosure follows two distinct approaches. The first approach does not try and estimate the actual cost of capital, but indirectly tests the relationship between cost of capital and disclosure by using a proxy measure (such as bid-ask spreads, trade volume and share price volatility, probability of informed trade, beta and total risk of a firm) for the cost of capital. Indirect tests generally focus on the overall weighted average cost of capital being both the cost of equity and the cost of debt.

The second approach, the direct method, estimates either the cost of equity or the cost of debt and then examines the relationship between these estimates and disclosure levels. This study applies the direct method and will estimate the cost of equity capital for companies in determining the relationship of the cost of equity capital with disclosure.

Prior research indicates that there is a negative relationship between disclosure levels and the cost of capital. Information asymmetry is one of the main reasons for this relationship and can arise when a firm possesses certain valuable information that has not yet been publicly disclosed. This private information may however become known to a few select investors outside of the firm. The uninformed investor will consequently demand a higher return to protect them against this information risk.

Information asymmetry can affect the cost of capital in the following two ways:

1. Information asymmetry among investors may be decreased by increasing disclosure, resulting in an increase in the liquidity of a company's share and a decrease in the premium demanded for the share. This increase in liquidity will cause transaction costs to decrease and the demand for the share to increase. This in turn will cause the cost of capital to decrease as found in studies by Amihud and Mendelson (1986), Diamond and Verrecchia (1991), Demsetz (1968), Copeland and Galai (1983) and Glosten and Milgrom (1985).
2. Less disclosure will increase information asymmetry between a company's managers and investors and will in turn increase the estimation risk surrounding a firm as there is more uncertainty in the market. If this estimation risk, which relates to estimates of the firm's asset return and the payoff distribution, is not able to be diversified, investors will require a higher return to compensate them for this risk. Barry and Brown (1984), Handa and Linn (1993) and Coles, Loewenstein and Suay (1995), Botosan (1997), Richardson and Welker (2001), Hail (2001) and Botosan and Plumlee (2002), all show that by increasing disclosure it will reduce the estimation risk and the return required leading to a decrease in the cost of capital.

The relationship between the level of voluntary disclosure and the cost of equity capital will be investigated for the top 100 companies listed on the JSE Securities Exchange for the period 1999 to 2003. The cost of equity capital for each firm in the sample will be estimated and compared to the respective level of disclosure for each firm, thereby adopting the direct method of testing.

The level of disclosure will be approximated by disclosure scores developed for the top 100 companies on the JSE Securities Exchange (JSE) by the Ernst and Young Excellence in

Financial Reporting survey. This disclosure score is made up of four weighted components namely, performance review, financial disclosure, forward-looking information and presentation. A full explanation of the source for the disclosure scores and method of rating is discussed in section 3.3 of this study. The hypothesis that the cost of equity capital is negatively correlated to the level of disclosure is investigated for the overall weighted disclosure and individually for each of the individual four components namely, performance review, financial disclosure, forward-looking information and presentation.

The cost of equity capital is estimated by using the residual income model as developed by Edwards and Bell (1961), Ohlson (1995) and Feltham and Ohlson (1995). The model estimates the intrinsic value of the firm, which is defined as the book value of equity plus the present value of future residual income. The implied cost of equity capital is the rate that equates the intrinsic value of the firm to the current market price of the share. The cost of equity capital is the rate that investors discount future expected residual income to arrive at the current market price for a share. Botosan (1997), Botosan and Plumlee (2000), Gebhardt, Lee and Swaminathan (2000), Richardson and Welker (2001) and Hail (2001) have all used this approach in determining the relationship between the cost of equity capital and the level of disclosure. This approach was adopted as it has the least amount of estimation errors. The CAPM is also used to estimate the cost of equity capital to test the robustness of the result achieved using the residual income model.

To test the hypothesis of a negative relationship between the level of financial disclosure and the cost of equity capital (COE), COE is regressed against beta, market value, leverage and the disclosure scores, which have been shown to represent a significant relationship with COE. Beta measures the market risk of a company (Bodie, Kane and Marcus, 1999) and therefore as beta increases, the risk of a firm will increase resulting in an increase in COE. Financial leverage is included in the model as a measure of risk and therefore as leverage increases it is expected that

the cost of equity capital would increase. However beta and leverage may also be correlated with each other. Therefore when performing the multiple regression analysis an adjustment will be made to take into account this multicollinearity. As the size of a firm increases, as indicated by market value, more information is made available reducing the risk of a firm resulting in a decrease in COE (Gebhardt, Lee and Swaminathan, 2001). The sample of this study consists of the top 100 companies on the JSE Securities Exchange. Even though the sample only consists of the largest 100 companies there is still merit in firm size as an independent variable as there is a large variation in size of companies in the sample.

## **1.2. MOTIVATION FOR RESEARCH**

This research will investigate whether increased levels of disclosure will decrease the associated potential risk that an investor faces if he/she had to invest in a particular company which would result in a decrease of the company's cost of capital.

## **1.3. RESEARCH OBJECTIVES**

The primary objectives of this investigation are to determine whether:

- There is a negative association between the quality of disclosure and the cost of equity capital; and
- There is a negative association between each of the four components of the overall disclosure score and the cost of equity capital.

The disclosure scores and the estimates for the cost of equity capital will also be tested to determine if they exhibit expected relationships with various independent variables.

In order to test the robustness of the findings of the primary objectives, the model developed will be analysed to determine if the findings are consistent:

- for all years in the sample as the relationship may have changed over the years
- across all firm year ends. The expected relationship may differ depending on the year end of the company.
- across all industry sectors. Some industries may experience a greater impact of increased disclosure.
- for other measures of the cost of equity capital.
- for different transformations of the disclosure scores.

#### **1.4. LIMITATIONS**

The following limitations may affect the results of the study:

- The study has been limited to the largest 100 companies on the JSE Securities Exchange and therefore there is selection bias and may not be representative of the South African market as a whole.
- A few large South African companies are not listed on the JSE Securities exchange and therefore the impact of these companies on the study can not be assessed.
- The study was performed for the years 1999 to 2003. As the introduction of King II and the harmonisation of the accounting standards to International Financial Reporting Standards only occurred from 2002 onwards, the effect of improved disclosure may not be fully reflected in this study.

## **1.5. ASSUMPTIONS**

The following assumptions have been made in the study:

- Disclosure levels as indicated by the annual financial statements are representative of the overall disclosure level in the market. Lang and Lundholm (1993) show that annual financial statement disclosure is positively correlated with the amount of disclosure provided via other sources. Therefore the annual financial statements may be used as a proxy for the overall disclosure level for a firm.
- The market capitalisation of a company is an indication of company size.
- Share prices and returns follow a random walk, which implies that share returns are normally distributed.
- No selection bias is created by the exclusion of companies from the sample, due to incomplete data, as their cost of equity capital is assumed to equal the average of the sample.

## **1.6. STRUCTURE OF THESIS**

The introduction is followed by a literature review (Chapter 2), which summarises previous studies relevant to the topic. Thereafter, the methodology used in analysing the data is described (Chapter 3). A discussion and analysis of the findings of the research follows the methodology (Chapter 4). Finally, conclusions and implications regarding the findings are discussed in relation to the research objectives (Chapter 5).

## 2. LITERATURE REVIEW

Previous theoretical and empirical research in the field of cost of capital and corporate disclosure is extensive. Therefore in trying to gain an understanding of the relationship between disclosure and the cost of equity capital this literature review will first explore the role of disclosure in capital markets, the South African disclosure environment and an understanding of the various streams of disclosure literature.

Once a general understanding of the above topics has been achieved the literature review will focus on the various streams of disclosure studies. Firstly, the difference between private and public information is explained. The literature review then explores the various studies of public information which include positive accounting theory and voluntary disclosure leading to an increased number of analysts of the firm, improved liquidity and lastly reduced cost of capital.

The literature review then investigates in greater detail into the theoretical and empirical studies of the effect of disclosure levels on the cost of capital. These studies follow two distinct methods of testing namely indirect, where by proxies are used for the cost of capital and the direct method where the cost of capital is estimated.

Firstly, the importance and relevance of the concept of cost of equity capital is explained followed by the role of disclosure in capital markets and the underlying factors resulting in the demand for disclosure. The disclosure environment in which a company operates may determine the quality and extent of disclosure; therefore the South African disclosure environment is described. The remainder of the literature review will focus on theoretical and empirical studies that have been performed in the area of disclosure of financial information and the relationship between financial disclosure and the cost of capital.



## 2.1. THE ROLE OF DISCLOSURE IN CAPITAL MARKETS

Disclosure is provided by firms in many ways, for example: annual financial statements, management discussion and analysis, and other regulatory filings. In addition to the mandatory disclosure that firms have to provide, some firms undertake to supply voluntary disclosure. This voluntary disclosure can take the form of management forecasts, analyst presentations, press releases, internet sites and other corporate disclosure. Lastly, there is disclosure about the firm by intermediaries, such as financial analysts, industry experts and the financial press (Healy and Palepu, 2001).

Healy and Palepu (2001) argue that the demand for disclosure in capital markets is due to two factors namely the level of information asymmetry in the market and the agency problem between managers and investors. Firstly, information asymmetry arises when there is a mismatch of information between management and investors. Management has certain information that it has not yet made known to investors and therefore has superior knowledge. There are two possible solutions to this problem. The first solution is the implementation of regulation that requires managers to fully disclose all private information. The second solution is that information intermediaries can engage in private information production which will provide them with extra information, which will enable them to reveal new information that will decrease management's level of superior information. Both of these solutions will result in increased disclosure.

Secondly, information asymmetry is caused by the agency problem. The agency problem arises because investors do not play an active role in the running of the business and delegate this role to management. The agency problem arises when there is a conflict of interests between the shareholders and management. This may result in management making decisions that benefit them more than the investors. Healy and Palepu (2001) suggest three solutions to this problem.

Firstly, contracts can be drawn up between the investors and management that align the interest of both parties. These contracts should require management to disclose relevant information so that investors can monitor management's performance. Secondly, a board of directors can be set up to represent the investors. This will ensure that investor's interests will be taken into account in the management of the company. Finally, information intermediaries produce private information that will highlight any misuse of funds by management. As with information asymmetry all three of these solutions should result in more disclosure being made available.

The above study therefore shows that disclosure levels will be increased to decrease the risk facing investors.

## **2.2. REGULATION OF DISCLOSURE AND FINANCIAL REPORTING**

To fully understand the reporting environment in South Africa an understanding of the regulations and standards governing disclosure is required. The extent and nature of disclosure is determined by South African Statements of Generally Accepted Accounting Practice (GAAP), the Company's Act, JSE Listing Requirements and various voluntary disclosure recommendations.

The South African Statements of GAAP represent the generally accepted accounting treatment of transactions and have been harmonised with International Financial Reporting Standards (IFRS) issued by the International Accounting Standards Board (IASB). This has been done in accordance with circular 5/2003 issued by The South African Institute of Chartered Accountants. A process has been implemented to align the text of South African GAAP statements as a result of the IASB's improvements project. Statements of GAAP which will not be revised will be re-issued to align their text with IFRS. Therefore in the future the South African statements of GAAP will be identical to IFRS.

There are many regulations that regulate corporate reporting and disclosure. In South African the Companies Act governs all companies incorporated in South Africa. The Act contains various disclosure requirements and Schedule 4 to the Act prescribes certain minimum disclosure items.

The Companies Act 61 of 1973 states that *“the annual financial statements of a company shall, in conformity with generally accepted accounting practice, fairly present the state of affairs of the company and its business as at the end of the financial year concerned and the profit or loss of the company for that financial year and shall for that purpose be in accordance with and include at least the matters prescribed by Schedule 4, in so far as they are applicable, and comply with any other requirement of this Act.”* This section of the Act therefore only requires a company to comply with generally accepted accounting practice and not the Statements of GAAP.

In contrast to this, in terms of Paragraph 5 of Schedule 4 of the Act *“if it appears to the directors of a company that there are reasons for departing from any of the accounting concepts stated in Statements of Generally Accepted Accounting Practice approved by the Accounting practices Board, where such appropriate Statements exist, in preparing the company’s financial statements in respect of any accounting period they may do so, but particulars of the departure, the effects and the reason for it shall be given”*.

There is therefore some confusion as to whether companies needed to comply with either generally accepted accounting practice or Statements of GAAP. A legal opinion was obtained by SAICA in September 1999 which concluded in Circular 8/99 that in order to comply with the Companies Act, the financial statements are to be prepared in accordance with generally accepted accounting practice. However, if this materially departs from Statements of GAAP, disclosure should be made of the effect of the departure.

In addition to the Companies Act, companies who are listed on the JSE Securities Exchange (JSE) are required to comply with certain minimum listing requirements that include disclosures that have to be made. Paragraphs 8.57 to 8.61 of the Listing Requirements detail the minimum contents of interim, provisional and abridged reports, whilst paragraphs 8.62 to 8.64 deal with annual financial statements. The revised Listing Requirements will require companies to comply with International Financial Reporting Standards (IFRS) for financial periods commencing on or after 1 January 2005.

To date there has been no legal backing for the Generally Accepted Accounting Standards (GAAP) in South Africa; however significant developments have been made in developing legislation. The most significant development is the draft Financial Reporting Bill, an initiative of the Ministry of Finance to improve the quality of financial reporting. The draft bill proposes legal backing for GAAP, the establishment by the Financial Services Board of an investigative committee and an enforcement committee and the development of limited purpose financial reporting standards to be used by certain small and medium sized entities.

In conjunction with the Statements of GAAP and the regulatory requirements there are certain guidelines on voluntary disclosure which detail best practice in terms of corporate governance, stakeholder communication and social disclosure. The South African corporate governance standard is the King II Report, which details best practice for corporate governance practices and disclosures in the annual financial statements relating to corporate governance. King II applies to all companies listed on the JSE Securities exchange, however all companies are recommended to apply King II principles. King II focuses on the following main categories for which disclosure is required: boards and directors, audit and auditing internal audit, risk management, non-financial matters, relations with shareholders, communication and code of ethics.

The South African Institute of Chartered Accountants issued guidance on Stakeholder Communication in the Annual Report in response to the requirements of the King Report to disclose material matters of significant interest and concern to all stakeholders. The guide covers the following general areas: risks and uncertainties for the company, financial results and returns, accounting policies and areas of judgement, capital structure, future investments, employment policies and environmental and social responsibility.

All of the above disclosure requirements are taken into account determining the disclosure scores developed by the Ernst & Young Excellence in Financial Reporting survey.

### 2.3. DISCLOSURE LITERATURE

Previous disclosure literature is very diverse and covers a large variety of research areas. The following diagram summarises the various streams of research:

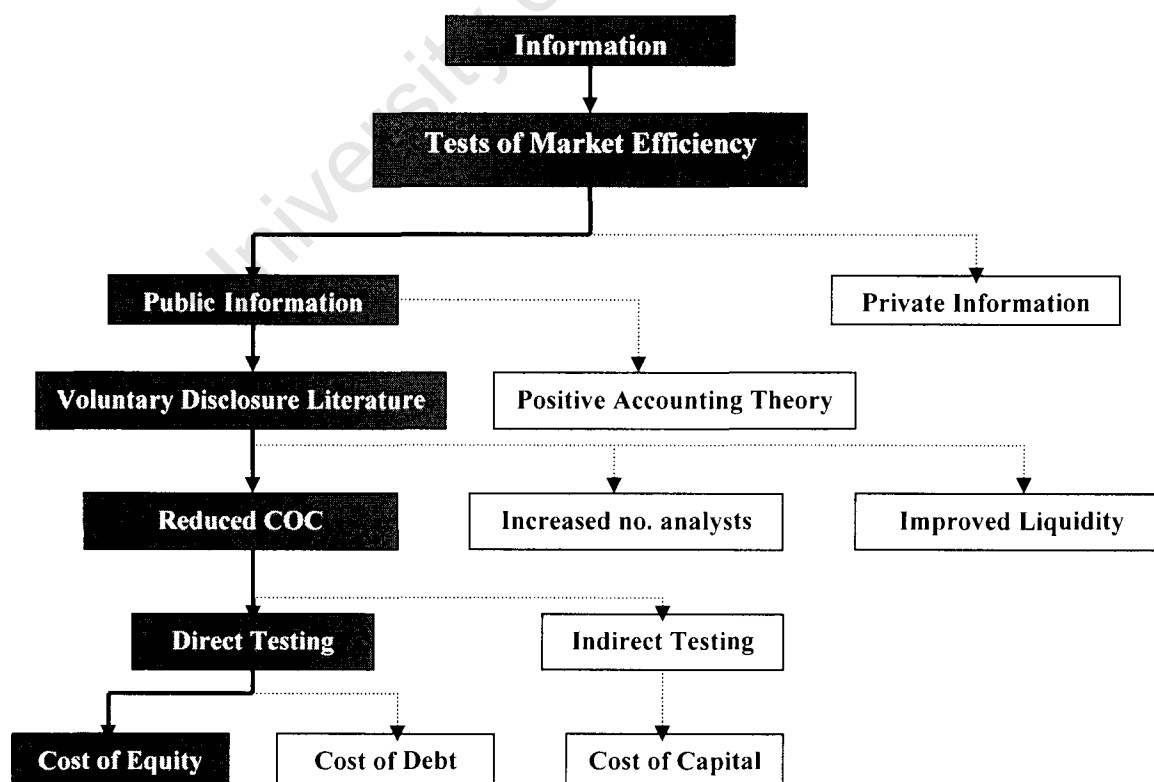


Diagram 1: Disclosure Literature - streams of research

As Diagram 1 illustrates, information regarding a firm can either be private information or information which is publicly available. Following this, research around publicly available information follows two research streams. One being positive accounting theory and the other voluntary disclosure literature. Within the voluntary disclosure literature there are three major areas of research, these investigate the level of voluntary disclosure against; improved liquidity, increased number of analysts following the firm and reduced cost of capital.

The research into cost of capital and disclosure of information also follows two distinct streams of research. Firstly, indirect testing looks at the relationship between cost of capital and disclosure. These studies are indirect as they use proxy measures (e.g. bid-ask spreads, trade volume and share price volatility, beta and total firm risk) for the cost of capital and do not try and estimate the actual cost of capital. It must be noted that indirect testing focuses on the overall cost of capital being both the cost of equity and the cost of debt. The second stream of research is direct testing. Direct testing tries to estimate either the cost of equity or the cost of debt and then examines the relationship between these estimates and disclosure.

This study will focus on voluntarily disclosed public information that has the effect of reducing the cost of capital. The study will follow the direct testing approach to the relationship between cost of equity capital and disclosure. (This is illustrated on the Diagram 1 by the solid line and the shaded boxes.)

## **2.4. PRIVATE AND PUBLIC INFORMATION**

Information available about a firm consists of both private and public information. Prior research has investigated both private and public information affects and these are discussed below.

#### **2.4.1. Private Information**

The first stream of research investigates the effect of private information. Admati (1985) analysed the effects of private information in a multi-asset model. Her study examined how an asset's equilibrium price is affected by information on its own fundamentals and other assets. Admati (1985) finds that each investor has a different risk-return trade-off. Easley and O'Hara (2002) confirm the finding of Admati (1985) and state that informed and uninformed investors hold different portfolios.

Wang (1991) used a two-asset multi-period model to show that private information results in two effects on asset prices. First, uninformed investors require a premium to compensate them as they do not have as much information available as informed investors. Second, when informed investors trade this makes prices more informative as more private information will be captured in the price. This will in turn reduce the risk facing uninformed investors and therefore will also reduce the premium required.

All the above studies therefore show that if there is private information in the market a premium will be required for the company's equity as there is increased risk. No premium will be required if the market is strong form efficient as all information of every kind will then be reflected in the share price. Evidence has indicated that the South African market is not strong form efficient (Thompson and Ward, 1995) and therefore a premium will be required for private information.

#### **2.4.2. Public Information**

When information is disclosed it turns private information into public information. Therefore this stream of research looks at the role of public information in affecting the asset prices. This

therefore assumes that the market is semi-strong efficient as all public information is reflected in the share price. There is evidence that the South African market is semi-strong form efficient (Thompson and Ward 1995). The next section expands the research into public information.

## **2.5. REPORTING AND DISCLOSURE EFFECTS OF PUBLIC INFORMATION ON CAPITAL MARKETS**

Capital market consequences of disclosure have been examined by both positive accounting theory and voluntary disclosure literatures. Positive accounting theory has focused on the effect that changes to the accounting methods and standards have on the capital markets. On the other hand voluntary disclosure studies have looked at capital market consequences of a change in disclosure and a change in the level of disclosure.

### **2.5.1. Positive accounting theory**

Positive accounting theory studies investigate the effect of a change in accounting policy or accounting option that has been taken. These studies are explored below.

Dyckman and Smith (1979) and Collins, Rozeff and Dhaliwal (1981) find that oil and gas firms that have to change their policy for pre-production costs show a decline in their share price. Contradictory to this finding, Leftwich (1981) examined other accounting standard changes and finds no significant change in share prices. Similarly, studies of firm's accounting policy changes find no significant relationship between share returns at the announcement date of the accounting method change and contracting and political factors (Holthausen, 1981).



There are two possible reasons for the above findings. Firstly, accounting decisions can be seen to have no significant shareholder wealth effects. Therefore the shareholder will not gain from the change in accounting method as this only changes the reported earning and adds no intrinsic value to the firm. A second reason is that it may be difficult to measure the share price effects. An example of this is that accounting standards are set over a period of time and therefore it is difficult to capture the effects at the date the announcement is made. (Healy and Papelu, 2001)

Easley and O'Hara (2002) however show that there is an important role for the accuracy of information in asset pricing. Greater precision will directly lower a firm's cost of capital as it will reduce the riskiness of a firm. This finding is consistent with other accounting research which looks at the effect of accounting treatments on share prices.

Gietzmann and Trombetta (2000) consider how changes in accounting policy interact with the subsequent choice of voluntary disclosure. They conclude that there is no simple substitution between various communication channels that a firm may use. When firms change to a different accounting policy, either voluntarily or by regulation, they can not influence the impact the change in accounting policy by increasing the level of voluntary disclosure.

#### **2.5.2. Voluntary disclosure literature**

The studies around voluntary disclosure show that there are three capital market effects of increased voluntary disclosure. Namely, improved liquidity of the firm's shares, an increased number of analysts following the firm and a reduction in the firm's cost of capital (Healy and Palepu, 2001).

### 2.5.2.1. Improved Liquidity

Both Diamond and Verrecchia (1991) and Kim and Verrecchia (1994) hypothesised and found that increased voluntary disclosure would reduce any information asymmetries between investors and in turn would increase confidence levels in that share and consequently the share's liquidity would increase.

Following on from the previous research Healy, Hutton and Palepu (1999) found that firms with increased disclosure experience an increase in their share price that is not related to current performance. Gelb and Zarowin's (2000) study shows that firms with high disclosure ratings have high share price associations with current and future earnings, relative to firms with low disclosure ratings. Both these studies show that disclosure strategies affect the speed at which information is reflected in share prices.

Contradicting the above findings Ohlsen (1979) shows that the quality, extent or volume of information that is disclosed in the annual reports has no effect on stock prices and risk. A similar result is found by Garsombke (1976). In South Africa Nagash (1990, 1995) supported the observation that the quality or extent of disclosure has no effect on the share price or risk.

Further studies attempted to measure share liquidity and the relationship between liquidity and disclosure. Welker (1995) finds a significant negative association between disclosure ratings and bid-ask spreads, the measure used for liquidity. However, Healy, Hutton and Palepu (1999) document that firms that had increased disclosure ratings had higher bid-ask spreads than their peers. But after the disclosure increase their bid-ask spreads reverted back to the level of their peers. Leuz and Verrecchia (2000) confirm the finding by Welker (1995) and also find that firm's with higher levels of disclosure have lower bid-ask spreads.

The above studies therefore indicate that increased disclosure levels lower bid-ask spreads, which will increase the liquidity of a firm's share.

#### **2.5.2.2. Increased number of analysts**

Bushman (1989 a, b) and Lang and Lundholm (1996) argue that if management's private information will not be fully reflected in required disclosure, voluntary disclosure will reduce that cost of information for analysts and therefore increase the number of analysts. However the effect of increased disclosure on the demand for analysts is ambiguous. As firstly, increased disclosure enables an analyst to create valuable new information that was not possible before and therefore there would be an increase in demand for analysts. On the other hand increased voluntary disclosure provides the public with some information regarding management's private information. This is what the analysts would normally do and therefore this may cause a decline in demand for analysts (Healy and Palepu, 2001).

Supporting the first effect above Land and Lundholm (1993) show that firms that have higher disclosure experience a larger analyst following, less variation in analyst forecasts and less volatility in forecast revisions. Francis, Hanna and Philbrick (1998) also find that there is an increase in analyst following for firms who make conference calls to analysts thereby increasing the level of information available.

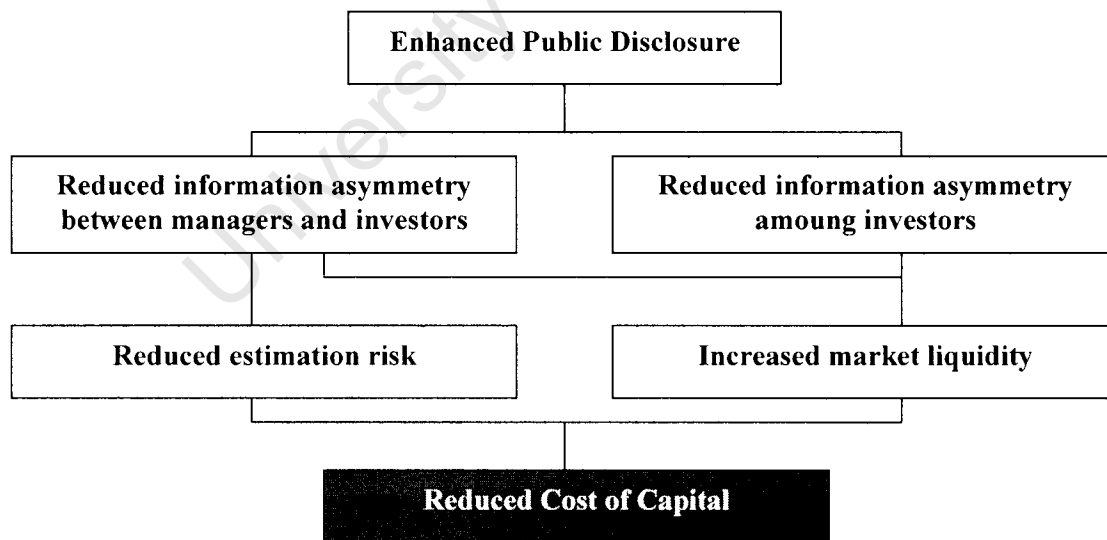
#### **2.5.2.3. Reduced cost of capital**

There are many studies on the effect of disclosure on cost of capital. These will be fully discussed in the following section.

## 2.6. DISCLOSURE EFFECTS ON THE COST OF CAPITAL

A firm will benefit when increased disclosure will result in a lower cost of capital. Cost of capital is the required rate of return for investors and represents the required rate of return for any project to add value to the firm. Inadequate and incomplete information may be reflected in the cost of capital as a premium above the risk-free rate of return. The minimum cost of capital is the risk-free rate of return plus the premium for economic risk (Elliot and Jacobson, 1994). One of the proposed benefits of improved disclosure is the decrease in uncertainty regarding the future of the company (Hirshleifer, 1971; Nagash, 1995). By decreasing uncertainty, the risk of a firm will be decreased and therefore should result in a decrease in the cost of capital.

There are two streams of research that support the hypothesis of a negative association between the level of disclosure and the cost of capital. Diagram 2 is a schematic diagram of the two main ways in which disclosure can reduce the cost of capital.



**Diagram 2: The effect of increased disclosure on Cost of Capital**

(Botosan, 2000 p61)

Firstly, increased disclosure by a firm will result in greater liquidity of a firm's share as it reduces the information asymmetry among investors. Information asymmetry exists when there is an imbalance between the nature and extent of information available to two different parties. The greater liquidity will then cause transaction costs to decrease and the demand for the share to increase. Both these factors combined will cause the cost of capital to decrease (Botosan, 1997; Richardson and Welker, 2001; Hail, 2001; Botosan and Plumlee, 2002). For example Amihud and Mendelson (1986) show that the cost of capital is greater for firms that have larger bid-ask spreads, which results in decreased liquidity, as investors require a higher return for the increased transaction costs. Diamond and Verrecchia (1991) find that greater disclosure reduces the information made known by a large trade. This will cause less of a price effect and in turn investors are willing to take on larger positions in the share and therefore demand for the share will increase and reduce the cost of capital.

The second stream of research hypothesises that increased disclosure will reduce the estimation risk surrounding a firm as the information asymmetry between managers and investors will be reduced. This estimation risk relates to estimates of the firm's asset return and the payoff distribution. When there is little information about a particular firm the uncertainty around that firm is greater. The more uncertainty there is, the greater the estimation risk is going to be. If this estimation risk cannot be diversified investors will require a higher return to compensate them for this risk thereby leading to an increased cost of capital.

Barry and Brown (1984), Handa and Linn (1993) and Coles, Loewenstein and Suay (1995) conclude that estimation risk cannot be diversified. Therefore increasing disclosure will increase the amount of information available about the firm, which will result in a lower estimation risk and therefore investors will require a lower premium for this risk. As a lower premium is required it will result in a lower cost of capital (Botosan, 1997; Richardson and Welker, 2001; Hail, 2001; Botosan and Plumlee, 2002).

Both arguments of the negative relationship between disclosure and cost of capital depend on the reduction of information asymmetry. The relationship between information asymmetry and the cost of capital is discussed below.

### **2.6.1. Information asymmetry and the cost of capital**

Information asymmetry can arise when a firm possesses certain value relevant information that has not yet been publicly disclosed. This private information may become known to a few select investors, which will create an adverse selection problem as uninformed investors face an information risk. This will continue until this information is publicly disclosed or it is incorporated in the price through informed trading. Since the profits of informed investors equals the losses of uninformed investors (Kyle, 1985), uninformed investors will demand a higher return to protect themselves against this information risk. Therefore information asymmetry is thought to encourage unwillingness to trade and increase the cost of capital as investors price-protect them against any loss from trading with less information than other informed investors (Bhattacharya and Spiegel, 1991; Holmstrom and Tirole, 1993).

Increasing the level of disclosure, reduces the possibility of information asymmetry occurring between the firm and its shareholders or between buyers and sellers of the share as more information is made available to uninformed investors. This will cause the discount at which the shares are issued to decrease, resulting in a lower cost of capital (Diamond and Verrecchia, 1991; Baiman and Verrecchia, 1996). Supporting this finding Brown, Finn and Hillegeist (2001) found that higher quality disclosure reduces any uncertainties and increases investors confidence, this will lead to a lower level of information asymmetry and therefore a lower cost of capital.

Easley and O'Hara (2002) suggest that differences in the composition of information between public and private information will affect the cost of capital. Investors will require a higher return for firms that have a larger percentage of private information. This reflects the fact that private information increases the risk to uninformed investors because informed investors are better able to shift their portfolios to incorporate new information. The greater amount there is of private information, the greater the level of information asymmetry there is. Greater disclosure increases the quality of public information available, and this in turn leads to a convergence of expectations between market participants. This therefore decreases the level of information asymmetry in the market.

Diamond and Verrecchia's (1991) study shows that by revealing public information to reduce information asymmetry one can reduce a firm's cost of capital by increasing the demand from large investors due to the increased liquidity of the firm's shares. This finding is supported by Amihud and Mendelson (1986), Brennan and Subrahmanyam (1996) and Pastor and Stambaugh (2001) who find that there is a positive association between information risk and returns. Therefore if a firm can reduce its amount of information asymmetry by improving its disclosure practices, the empirical evidence indicates that it will reduce its cost of equity.

#### **2.6.2. Arguments against disclosure effects**

The following arguments have been made against disclosure effects.

Managers have incentives to minimise the volatility of share price movements by controlling the flow of information to eliminate fluctuations in earnings and mislead shareholders with respect to the relative riskiness of the firm. If managers had to manipulate or not publish certain adverse information, subsequent disclosure of this information might result in lower market prices and a

higher cost of equity capital. Likewise if managers try to avoid or manipulate disclosure to make the firm seem less risky to investors, subsequent disclosure might result in higher risk than perceived by investors. This increase in perceived risk will cause an increase in the cost of equity capital of the firm (Dhaliwal, 1979).

Given that there are conflicts of interests between managers and shareholders, management disclosures may not be viewed as credible to shareholders. Managers also argue that increased disclosure actually reduces shareholder value by revealing valuable information about the firm to competitors or by increasing legal costs for the firm (Verrecchia, 1983, 1990; Darrough and Stoughton, 1990; Wagenhofer, 1990; Gigler, 1994; Newman and Sansing, 1993; Francis, Philbrick and Schipper, 1994; Skinner, 1994; Healy and Palepu, 1995).

Even though the above arguments have been made against a negative relationship between disclosure levels and the cost of equity capital, there is stronger evidence that the relationship exists.

### **2.6.3. Research of disclosure effects**

The research into the disclosure effects on the cost of capital has followed two distinct approaches. Firstly, the indirect approach looks at the impact of disclosure on variables that are positively correlated with the cost of capital. Early studies used beta and total risk as proxies for the cost of capital. More recent studies have used the relationship to information asymmetry to examine disclosure effects. These studies examine the association between proxies for information asymmetry and disclosure levels. The indirect approach looks at the overall cost of capital (i.e. cost of equity and debt).



Secondly, the direct approach explicitly looks at either the cost of equity capital or the cost of debt, which together make up the overall cost of capital. The direct approach attempts to make estimates of either the cost of equity capital or the cost of debt and then compares these estimates to the level of disclosure.

## **2.7. INDIRECT TESTING**

As mentioned above indirect testing looks at the association between proxies of information asymmetry of the cost of capital and the disclosure levels. The proxies for cost of capital that have been used in prior studies are bid-ask spreads, trading volume and share price volatility, probability of informed trade (PIN) and beta and total risk of a firm. For each of these four proxies it has been shown that there is a relationship between the proxy and the disclosure policy of a firm (Core, 2001).

### **2.7.1. Bid-ask spreads**

The first proxy, the bid-ask spread, is thought to measure information asymmetry explicitly. The reason for this is that the bid-ask spread addresses the adverse selection problem between buyers and sellers. Less information asymmetry implies less adverse selection, which in turn will result in a lower bid-ask spread (Leuz and Verrecchia, 2000). Bid-ask spreads, which are a measure for market liquidity, are predicted to be inversely related to disclosure policy. Increased trading by informed investors and a higher probability of an information event occurring are both thought to decrease spreads and strengthen the relationship between spreads and disclosure (Welker, 1995). Disclosure policy influences market liquidity as uninformed investors price protect them against adverse selection, and this price protection is manifested in the liquidity of the market.

Welker (1995) investigates the association between disclosure quality and the closing relative bid-ask spreads. According to Welker (1995) spreads compensate market makers for the following type of costs: (1) adverse selection costs that reflect information asymmetry, (2) inventory costs that result from holding a non-optimal diversified portfolio, (3) order processing costs. Welker's results show that there is a negative relationship between higher overall disclosure scores and relative spreads, even after controlling for return volatility, trading volume and share price. Welker's (1995) study shows that the relative bid-ask spread for firms in the bottom third of the rankings are approximately 50 percent higher than firms with rankings in the top third.

Confirming Welker's (1995) results Healy et al. (1999) also find that better disclosure is associated with smaller bid-ask spreads. Similarly, Collier and Yohn (1997) show that increased disclosure of management forecasts reduce bid-ask spreads. Amihud and Mendelson (1986) and Bloomfield and Wilks (2000) also suggest that improvements in liquidity will also increase prices because investors demand less of a premium to cover the likely cost of closing out their positions in the future.

All the above studies investigated the once-off improvement in disclosure levels. Building on this Healy, Hutton and Palepu (1999) use a time-series approach to investigate whether firms that have sustained improvements in disclosure, as shown by disclosure ratings, improved stock performance and capital market intermediation. The capital market intermediation is shown by increased stock liquidity, institutional interest and analyst following.

Their findings showed that firms show a significant increase in share performance in the year of the disclosure increase and the following year. Their study also showed that increased disclosure is related to improved liquidity, growth in institutional ownership and analyst coverage.

The above studies reveal that majority of studies using the bid-ask spread as a proxy for the cost of capital found that there is a negative relationship between the level of disclosure and the bid-ask spreads and consequently a negative relationship between the level of disclosure and the cost of capital.

### **2.7.2. Trade volume and share price volatility**

Two further proxies for information asymmetry are trading volumes and share price volatility.

Trading volume is a measure of liquidity in that it captures the willingness of some investors to sell the shares that they hold and willingness of other investors to buy shares. This willingness to buy and sell shares should be inversely related to the level of information asymmetry.

Share price volatility has been used in prior studies as a proxy for information asymmetry (Lang and Lundholm, 1993). Low volatility in share prices suggests that there is a very low level of information asymmetry between the firm and shareholders and between investors. It must also be noted that volatility is also affected by many other factors. Bushee and Noe (2000) show that the effect of disclosure on volatility is complex and may depend on the type of investor attracted to the firm. Due to the above mentioned reasons one would expect that volatility as a measure of information asymmetry would likely be the weakest measure (Leuz and Verrecchia, 2000).

Leuz and Verrecchia (2000) examine both these measures of information asymmetry and find that firms who switched to IFRS or US GAAP from German GAAP experience a significant increase in share volume. However they were unable to find a negative association between share price volatility and increases in disclosure.

### 2.7.3. Probability of Informed Trade (PIN)

The third proxy for information asymmetry is the Probability of Informed Trade (PIN) measure. PIN measures the probability that a trade was initiated by an investor who has obtained private information about the value of a firm. The advantage of using the PIN measure is that it is a direct measure of information asymmetry, whereas using spread-based measures for information asymmetry is an indirect measure and the results are difficult to interpret. Lee, Mucklow and Ready (1994) show that when developing a proxy for information asymmetry, one must account for both spreads and market depths, since market makers will manipulate both to protect themselves against information asymmetry. This is shown in the study by Heflin, Shaw and Wild (2001) who used both spreads and depths as proxies for information asymmetry. Their results show that disclosure scores are negatively associated with effective spreads; however they are negatively associated with depths as well. This is contradictory as one would expect depths to decrease with the level of information asymmetry and increase with the level of disclosure. Therefore resulting in a positive relationship not a negative one.

Brown, Finn and Hillegeist (2001) examine the relationship between disclosure quality and PIN measure as a proxy for information asymmetry. Their results show that overall disclosure quality, as measured by the Association for Investment Management and Research (AIMR), is negatively associated with the level of information asymmetry.

Brown, Finn and Hillegeist's (2001) study focuses on the relationship between overall disclosure score and the three components that make it up namely: annual report, quarterly report and investor relations. However their result for the three category scores differs from that of Botosan and Plumlee (2000). Their results show that there is significantly negative association between PIN and investor relations but no other significant associations are found for annual report or quarterly report.

A similar result is found by Easley, Hvidkjaer and O'Hara (2000) who found that firms with greater information asymmetry earn higher returns after controlling for Beta, Size and Book-to-Market ratios.

Previous research therefore suggests that higher levels of information asymmetry, approximated by the PIN measure, could result in a higher cost of capital for firms.

#### **2.7.4. Beta and Total Risk of a Firm**

Earlier indirect studies used the proxy measures of beta and total risk of a firm, as measured by the standard deviation of a firm's return, for the cost of capital.

Dhaliwal (1979) investigates the impact of disclosure regulations that required segmental disclosures on a firm's cost of capital. His study assumed that the Capital Asset Pricing Model (CAPM) had validity in the market. The proxies were firstly beta, which is the systematic risk of the firm. CAPM is defined as the risk-free rate plus beta times by the market risk premium (Ross, Westfield, Jordan and Firer, 1996). The risk-free rate and the market risk premium remains constant across all firms in the market. Therefore the only variable that can influence a firm's cost of equity capital would be beta.

Secondly, the standard deviation of the firm's returns is used as another proxy. The total risk relating to a firm is made up of two parts: (1) firm specific risk or unsystematic risk and (2) market risk or systematic risk. In a diversified portfolio unsystematic risk is diversified away and therefore would not affect cost of equity capital. However it has been shown that investors tend to on average under-diversify (Bierman, 1974). This suggests that the firms own standard deviation is a relevant risk measure as not all the unsystematic risk can be diversified away and

therefore will affect the cost of equity capital. This view is supported by Arditti (1967) and Haley (1972) who find that realised returns are related to their own standard deviations.

Dhaliwal's study (1979) shows that disclosure regulation significantly decreased the cost of equity capital as proxied by the standard deviation of the firm's returns. The relationship with beta also results in a decrease in the cost of equity capital; however the effect was much weaker.

Dhaliwal, Spicer and Vickery (1979) examine the relationship between increased disclosure on the cost of equity capital. The specific increase in disclosure was the SEC's requirement that segmental disclosure be given. This study uses the same surrogates for cost of equity capital as Dhaliwal (1979). Dhaliwal, Spicer and Vickery find that increased disclosure, measured by producing segmental disclosure, reduced the cost of equity capital. They however cautioned their results as the tests were only done using two surrogates for the cost of equity capital and the assumption was made that security returns follow a normal distribution.

In conclusion, early studies using beta and standard deviation of returns as proxies for the cost of capital showed a negative relationship between the cost of capital and the level of financial disclosure.

#### **2.7.5. South African evidence of a negative association between the level of disclosure and the Cost of Capital**

Negash (2001) examines whether uncertainty that arises from information asymmetry can be measured by stock price volatility and the beta coefficient. More specifically Negash (2001) tests whether firms that release more information through the annual financial report, which results in lower information asymmetry, will have a lower adverse selection component of their bid ask

spread. His study only looked at companies in the industrial sector for the years 1993-1995. This study could not establish whether disclosure was an increasing or decreasing function of uncertainty, represented by the bid-ask spread. However Negash (2001) states that even though the nature of the relationship could not be established, there is definitely an association between the two. Therefore in South Africa there is no conclusive evidence that increased disclosure will reduce a company's cost of capital.

## **2.8. DIRECT TESTING**

Direct testing investigates the relationship between disclosure levels and the cost of equity capital and the cost of debt individually. Research in this area attempts to estimate a value for either the cost of equity capital or the cost of debt and then determine the relationship between these estimates and the level of disclosure.

### **2.8.1. Cost of Debt**

Sengupta (1998) examines the association between a firm's overall disclosure quality and the cost of debt. A negative relationship between disclosure and the cost of debt is hypothesised. The reason for this is that, firms with increased levels of disclosure could be perceived to have a lower likelihood of withholding valuable unfavourable information, resulting in a lower risk premium being charged, which would decrease the cost of debt.

Sengupta (1998) uses the Association for Investment Management and Research (AIMR) ratings of disclosure as a proxy for the quality of disclosure. His sample covered companies who had disclosure ratings for the years 1987-1991. The cost of debt was measured as the yield to maturity and the effective interest cost to the issuer (Sengupta, 1998). His findings indicate that

there is a significant negative relationship between a firm's overall disclosure and the cost of debt.

### **2.8.2. Cost of Equity Capital**

Botosan (1997) was one of the first researchers in this area of research. In her study she estimated the cost of equity capital using an accounting based valuation model developed by Edwards and Bell (1961), Ohlsen (1995) and Feltham and Ohlsen (1995). Her results show that the estimates for the cost of equity capital are both increasing in beta and decreasing in firm size and therefore are reasonable. Botosan's study investigated disclosure levels provided in the 1990 annual reports for a sample of firms in the manufacturing industry. She developed her own measure of disclosure level, which was based on the amount of voluntary disclosure provided.

The association between disclosure and cost of equity capital is tested after controlling for market beta and firm size. Botosan's (1997) results reveal that there is a negative association between cost of equity capital and disclosure; however these results were only significant for those firms with low analyst following. Botosan (1997) also finds that for firms with low analyst following, disclosure of forecast information and key non-financial statistics is important. For firms that have a high analyst following disclosure of historical information is found to be advantageous. As Botosan's study only looked at one particular industry and for one year no generalisation can be made from the findings.

Extending Botosan's study Richardson and Welker (2001) tested the association between financial as well as social disclosure and the cost of equity capital. Social disclosure can also reduce the cost of equity capital by reducing transaction cost and reducing estimation risk (Richardson, Welker and Hutchinson, 1999). Richardson and Welker (2001) also estimate the



cost of equity capital using an accounting based valuation model. However their study used the Association for Investment Management and Research (AIMR) rankings of disclosure for US companies. Thus their study examines a far greater number of companies than Botosan (1997).

Richardson and Welker (2001) find that there is a significant negative relationship between the level of financial disclosure and the cost of equity capital. They also confirm Botosan's (1997) result that this relationship is more prevalent for firms that have a low analyst following. For social disclosure a significant positive relationship was found between the level of social disclosure and the cost of equity capital. This relationship is however not affected by the number of analysts following the firm.

Botosan and Plumlee (2001) also examine the association between disclosure and the cost of equity capital. Their study also estimates the cost of equity capital as the previous two studies and uses the AIMR ratings as a proxy for disclosure scores. Botosan and Plumlee (2001) extend their research one step further and look at the relationship between the three types of disclosure (which are annual report disclosure, timeliness of disclosure and level of investor relations) that make up the overall disclosure ranking and the cost of equity capital.

Their results show that greater total disclosure is not significantly associated with a lower cost of equity capital. However when looking at the individual components of the overall disclosure, different relationships evolve. They show that the cost of equity capital is negatively related to the quality of annual report disclosure and positively related to the timeliness of disclosure as represented by quarterly disclosures. They find no association between the cost of equity capital and the level of investor relations activities as measured by presentations to analysts and analyst interviews.

Outside of the US, Hail (2001) examined the relationship between levels of disclosure and the cost of equity exhibited by Swiss Firms. His estimates for the cost of equity capital were derived in the same way as in the previously discussed researches, whilst the disclosure index used was independently developed by the Swiss Banking Institute.

The results of his study show that there is a highly significant negative relationship between the estimate for the cost of equity capital and the disclosure rankings. As with Botosan's (1997) study this research was only done for a one year period, 1997, and therefore caution must once again be taken when interpreting the results.

### **2.8.3. South African evidence of a negative association between the level of disclosure and the Cost of Equity Capital**

There is currently no published study which investigates the negative association between the level of disclosure and the cost of equity capital in the South African market. This study investigates the relationship between cost of equity capital and disclosure levels using the direct method of testing, which will involve estimating the cost of equity capital. The following chapter develops the methodology and hypotheses used in the research.

### 3. METHODOLOGY

The cost of equity capital is estimated for each firm in the sample and then compared to the respective level of disclosure for each firm, thereby adopting the direct method of testing. The methodology will firstly develop the hypotheses tested in this study and then discuss the model used and each of the dependent and independent variables in this model. The selection of the sample, main test and sensitivity tests will then be discussed.

#### 3.1. HYPOTHESIS DEVELOPMENT AND RESEARCH DESIGN

##### 3.1.1. Hypothesis Development

There are two main streams of research that support the negative association between the cost of equity capital and increased disclosure levels. The first stream of research suggests that increased disclosure increases stock market liquidity through decreasing information asymmetry between investors. This in turn will reduce the cost of equity capital either through decreased transaction costs or an increased demand for the firm's shares (Botosan, 1997; Botosan and Plumlee, 2002; Richardson and Welker, 2001; Hail, 2001).

The second stream of research shows that increased disclosure levels reduces the estimation risk with regard to the estimates of a firm's asset return or the dividend distribution by decreasing the information asymmetry between management and investors. There is more uncertainty regarding these estimates when there is less information about a particular firm. Therefore an increased amount of disclosure will decrease this uncertainty and will also decrease the amount of estimation risk. Handa and Linn (1993) and Coles et al. (1995) conclude that estimation risk

cannot be diversified and therefore investors will require compensation for this risk. This results in the relationship that increased disclosure will lead to less uncertainty and less estimation risk. This will in turn lead to investors requiring less of a premium for the risk and overall reducing the cost of equity capital (Botosan, 1997; Botosan and Plumlee, 2002; Richardson and Welker, 2001; Hail, 2001).

The two streams of prior research discussed above both conclude that by increasing disclosure levels a firm's cost of equity capital may be reduced. Therefore the following hypothesis has been developed:

*H<sub>1</sub>: There is a negative association between the level and quality of voluntary disclosure and the cost of equity capital.*

The measure for the level of disclosure that will be used, is a disclosure score developed for the top 100 companies on the JSE Securities Exchange (JSE). This disclosure score is made up of four components namely, performance review, financial disclosure, forward-looking information and presentation. All four of these components are weighted to give the overall disclosure score. The following hypothesis is also expected to hold for each of these 4 components:

*H<sub>2</sub>: There is a negative association between each of the four components of the overall voluntary disclosure score and the cost of equity capital.*

### 3.1.2. The Model

The above hypotheses can be expressed as a model that states that a firm's cost of equity capital is dependent on four variables. Firstly, the systematic risk of a firm, which represents the risks specific to that particular firm. This is represented by the market beta of a firm. Secondly, the size of the firm that is indicated by the market capitalisation of the firm. Market capitalisation is the number of shares in issue multiplied by the share price. The third variable is the level of debt in the firm. Lastly, the level of disclosure will influence the cost of equity capital and this is indicated by a ranked disclosure score. The motivation for including the above independent variables is discussed in sections 3.3 to 3.6.

Regressing the expected cost of equity capital against the disclosure rank, the market beta, the natural log of the market value of the share and the financial leverage of the firm tests the hypotheses. This regression equation can be described as follows:

$$COE_{it} = \alpha + \beta_1 BETA + \beta_2 LMVAL + \beta_3 LEV + \beta_4 DRANK \quad \text{Equation 1}$$

Where:  $COE_{it}$  = Expected cost of equity capital for firm i in year t

$BETA$  = Market beta for the firm

$LMVAL$  = Natural log of the market value

$LEV$  = Financial leverage

$DRANK$  = Disclosure rank

The above regression is performed for both the overall disclosure score (hypothesis one) and each of the four components (hypothesis two).

### **3.2. DEPENDANT VARIABLE: THE COST OF EQUITY CAPITAL**

The dependent variable in the above model is the cost of equity capital and is dependent on market beta, market value, financial leverage and disclosure rank. In order to regress the model an estimate of the cost of equity capital needs to be made. There are various methods to estimate the value of a firm's cost of equity capital each with their own advantages and disadvantages, four approaches are discussed.

This study adopts the residual income model approach as its main estimate for the cost of equity capital. The CAPM is also used to estimate the cost of equity capital to test the robustness of the result achieved using the residual income model.

#### **3.2.1. Average realised returns**

One specific approach is to estimate the cost of equity capital using average realised returns. However, prior research has found it difficult to prove a significant relationship between average realised returns and market beta. This is significant as market beta is generally regarded as a measure of systematic risk for a firm (Ross, Westerfield, Jordaán and Firer, 1996). As the risk of the firm increases, investors will require a higher return, which will increase the cost of equity capital. Therefore one would expect a significant relationship between beta and an estimate for the cost of equity capital. Lakonishok (1993) concluded that in order for market beta to have a significant relationship with average realised returns, 70 years of data would be needed. Therefore this approach of estimating the cost of equity capital would be inappropriate for this study as the study is only looking at 5 years of data.

### 3.2.2. Capital Asset Pricing Model (CAPM)

Another widely used measure to estimate the cost of equity capital is the Capital Asset Pricing Model (CAPM). The CAPM defines the cost of equity capital as the sum of the risk free rate and the product of the firm's market beta and the expected market risk premium (Ross, Westerfield, Joridan and Firer, 1996). Therefore the CAPM implies that only a cross-sectional difference in market beta would cause a difference in the cost of equity capital between firms. However this study assumes that a cross-sectional variation in beta and disclosure levels will result in a variation of the cost of equity capital. The CAPM therefore makes no provision for the level of information made available (Botosan, 1997).

If the CAPM is used as an estimate for the cost of equity capital, one has to assume that cross-sectional differences in disclosure level will induce a variation in beta, as only a cross-sectional difference in beta will cause a change to the cost of equity capital. The empirical findings with regard to the relationship between disclosure and beta are contradictory. Singhvi and Desai (1971), Choi (1973) and Kochanek (1974) all find a negative relationship between the quality of disclosure and risk, which is measured by market beta. In contrast to this Garsombke (1976), Ohlson (1979) and Botosan (1997) all find that there is no significant relationship.

In South Africa, Negash (1995) finds that there is no significant relationship between the level of disclosure and beta. Scott (2001) confirms Negash's (1995) findings and shows that for two out of the three years tested, there is no significant relationship and only in one year there was a moderate significant relationship between beta and the quality of disclosure. Therefore using the CAPM to estimate the cost of equity capital would not be appropriate, as previous studies have found that there is no significant relationship between disclosure and beta in South Africa.

### **3.2.3. Earnings-to-price ratio**

A third estimate of the cost of equity capital is the earnings-to-price ratio adjusted for growth and dividend payout. Fifer (1993) argues that this measure can only be used when the expected future earnings is equal to the current earnings adjusted for growth at a rate equal to the cost of equity capital. Botosan (1997) confirms prior research which found that there was no connection between earnings-to-price ratios and the measure of risk, beta. Therefore this measure appears not to provide a reliable measure of the cost of equity capital.

### **3.2.4. Residual Income Model**

The fourth approach used by Botosan (1997), Botosan and Plumlee (2000), Gebhardt, Lee and Swaminathan (2000), Richardson and Welker (2001) and Hail (2001) estimates the expected cost of equity capital using an accounting based valuation model. This accounting based valuation model was developed by Ohlson (1995) and Feltham and Ohlson (1995). The accounting based valuation model is often referred to as the residual income model.

This model represents firm value as a function of current and forecasted accounting data, subject to clean surplus accounting. For clean surplus accounting to apply, all future changes in the book value of equity must arise either from earnings, capital contributions or dividends (Hail, 2001).

The model estimates the intrinsic value of the firm, which is defined as the book value of equity plus the present value of future residual income. Residual income is net income after tax less a required Rand return on the assets invested in the firm (Horngren, Foster, Datar and Uliana, 1999). The required rate of return used will be the cost of equity capital. The implied cost of



equity capital will then be the rate that equates the intrinsic value of the firm to the current market price of the share (Gebhardt, Lee and Swaminathan, 2000; Hail, 2001). Therefore the cost of equity capital is the rate that investors discount future expected residual income to arrive at the current market price for a share.

The derivation of the residual income model starts with the dividend discount model. This model states that the value of the firm is equal to the present value of all future dividends and is defined as follows:

$$V_t = \sum_{T=1}^{\infty} E_t \left[ \frac{d_{t+T}}{(1+r_e)^T} \right] \quad \text{Equation 2}$$

Where  $V_t$  = Intrinsic value of the firm at time  $t$   
 $d_t$  = Net dividends paid during the period  $(t-1, t)$   
 $r_e$  = The discount rate (cost of equity capital)

Applying clean surplus accounting the following relationship can be expressed:

$$bv_t = bv_{t-1} + x_t - d_t \quad \text{Equation 3}$$

Where  $bv_t$  = Accounting book value of equity at date  $t$   
 $bv_{t-1}$  = Accounting book value of equity at date  $t-1$   
 $x_t$  = Accounting earnings for the period  $(t-1, t)$   
 $d_t$  = Dividends for period  $(t-1, t)$

This expression shows that the book value of equity in any year is equal to the book value of equity at the beginning of that year plus the earnings for the year less any dividends paid (Ohlson, 1995).

To determine the residual income model, *Equation 3* is solved for dividends and is substituted into the traditional dividend discount model (*Equation 2*). This substitution will result in the following model:

$$V_t = bv_t + \sum_{T=1}^{\infty} E_t \left[ \frac{X_{t+T} - r_e * bv_{t+T-1}}{(1 + r_e)^T} \right]$$

$$= bv_t + \sum_{T=1}^{\infty} E_t \left[ \frac{(\text{PROF}_{t+T} - r_e) bv_{t+T-1}}{(1 + r_e)^T} \right] \quad \text{Equation 4}$$

Where  $\text{PROF}_t$  = After-tax return on book value of equity for period (t-1, t)

From the above equation, firm value can be expressed as the book value of equity today plus the infinite sum of the discounted expected residual income in the future. *Equation 4* expresses the value of the firm in terms of accounting numbers being future earnings, current and expected book values of equity. It must be noted that *Equation 4* is the residual income version of the dividend discount model.

By setting the intrinsic value in *Equation 4* equal to the share price, the implied discount rate can be solved by an iterative process. This implied discount rate would then represent the estimated cost of equity capital.

The intrinsic value of a firm can only be made equal to the share price if it is assumed that all publicly available information is impounded in the share price. This would require the South African market to be semi-strong form efficient. A semi-strong form efficient market is one in which all publicly available information is included in the price of a share (Ross, Westerfield, Jordaán and Firer, 1996). South African evidence shows that the market is semi-strong form (Knight and Affleck-Graves, 1985; Ooms, Archer, and Smit, 1987; Bhana, 1989) therefore all

publicly available information can be assumed to be included in the share price of South African shares listed on the JSE Securities Exchange.

*Equation 4* requires forecasting future earnings and book values to infinity. As this is practically impossible one needs to make estimates for a finite period and then calculate a terminal value at the end of the finite period (Gebhardt, Lee and Swaminathan, 2000; Hail, 2001). This study follows the approach of Gebhardt, Lee and Swaminathan (2000), Hail (2001) and Richardson and Welker (2001) and applies a three-stage approach to calculating the intrinsic value of a firm.

1. Use explicit earnings forecasts for the first three years.
2. Derive earnings forecasts by linearly fading year  $t+3$  after tax return on book value equity to the median market return on equity by year  $t+T$ . This simple linear interpolation reverts the firms after tax return on book value equity, at year  $t+3$ , to the industry's mean after tax return on book value equity at the end of year  $t+T$ . This attempts to encapsulate the long-term erosion of abnormal return on equity and the notion that in the long-run individual firms tend to achieve the same as the industry average (Gebhardt, Lee and Swaminathan, 2000).
3. Calculate terminal value by assuming year  $t+T$  residual income as a perpetuity. This does not imply that there is no growth in earnings or dividends. What it does assume is that any incremental economic profits, those from net new investments, are zero after year  $T$ . Therefore any growth is neutral after year  $T$  (Gebhardt, Lee and Swaminathan, 2000).

By using this 3-stage approach *Equation 4* can be rewritten in a finite form as follows:

$$V_t = bv_t + \sum_{T=1}^n \frac{(x_{t+T} - r_e * bv_{t+T-1})}{(1 + r_e)^T} + \sum_{T=n+1}^T \frac{(x_{t+T} - r_e * bv_{t+T-1})}{(1 + r_e)^T} + \frac{(x_{t+T+1} - r_e * bv_{t+T})}{r_e (1 + r_e)^T} \quad \text{Equation 5}$$

Where  $x_{t+T}$  = Expected future accounting earnings for period (t+T-1, t+T)  
 $bv_{t+T}$  = Expected future accounting book value of equity for year t+T  
 $bv_{t+T} = bv_{t+T-1} + x_{t+T} - d_{t+T}$   
 $d_{t+T}$  = Expected future net dividends  
= dividend payout ratio,  $k * x_{t+T}$

The explicit time period used is important, as we are now determining a finite time period and calculating a terminal value after the specific time period. When looking at what time period to use, Hail (2001) suggests that the intrinsic value of the firm, as calculated as a function of forecasted earnings and future book values, tends to the value of the share as the time period tends to infinity. In a previous study, Bernard (1995) also suggests that the intrinsic value tends to the firms share price so long as the time period used is long enough. Following Gebhardt, Lee and Swaminathan (2000), Hail (2001) and Richardson and Welker (2001) this study explicitly forecasts earnings for a three year period, earnings forecasts are then interpolated for a further nine years and the terminal value is then calculated at the end of the 12<sup>th</sup> year. This can be expressed as follows:

$$\begin{aligned}
V_1 = & bv_1 + \underbrace{\sum_{T=1}^3 \frac{(x_{t+T} - r_e * bv_{t+T-1})}{(1 + r_e)^T}}_{\text{Stage 1}} + \underbrace{\sum_{T=4}^{12} \frac{(x_{t+T} - r_e * bv_{t+T-1})}{(1 + r_e)^T}}_{\text{Stage 2}} \\
& + \underbrace{\frac{(x_{t+13} - r_e * bv_{t+12})}{r_e (1 + r_e)^{12}}}_{\text{Stage 3}} \quad \text{Equation 6}
\end{aligned}$$

Referring the above equation back to the three-stage approach, stage one explicitly forecasts earnings for a three year period, stage two derives earnings forecasts by linearly fading year three's earnings forecasts to the average return on equity of the market over a nine year period and stage three determines a terminal value at the end of year twelve by assuming that year twelve's residual income will continue into perpetuity.

The cost of equity capital is then determined by setting the intrinsic value of the firm ( $V_1$ ) equal to the market price of the share ( $P_1$ ) and solving for the cost of equity capital ( $r_e$ ).

### 3.3. INDEPENDENT VARIABLE: QUALITY OF DISCLOSURE

The first independent variable is the quality of disclosure. The disclosure variable is intended to capture the cross-sectional variation in disclosure quality between firms. The South African Companies Act, JSE Requirements together with South African Statements of GAAP requires certain minimum disclosure levels. Companies are however encouraged to provide additional voluntary disclosure.

To assess the quality of disclosure between firms, this study focuses on the disclosure provided in the annual report. The annual report is only one source of information disclosed to

stakeholders, other sources would include press releases and direct communication with analysts. However Lang and Lundholm (1993) show that annual report disclosure is positively correlated with the amount of disclosure provided via other sources. Therefore it is suggested that the annual report may be used as a proxy for the overall disclosure level about a firm in the market. Another advantage of using the annual report is that they are more easily comparable between companies than other forms of communication, for example press releases or direct contact with analysts (Hail, 2001).

As a measure for the level of disclosure provided by the annual report the study will be using the disclosure scores developed by the Excellence in Financial Reporting competition. Both regulatory and voluntary disclosure is assessed in determining the scores. As all companies are required to provide the regulatory disclosure it will only be the voluntary disclosure that would differentiate each company. Therefore this study is primarily looking at the different levels of voluntary disclosure provided by companies. The Excellence in Financial Reporting analysis looks at the annual financial statements of the top 100 companies on the JSE Securities Exchange (JSE). The top 100 companies are determined according to their market capitalisation as at the 31 October every year. For example the 2002 report would have reviewed the annual financial statements for the top 100 companies with a year end between 1 November 2000 and 31 October 2001.

The annual financial statements are adjudicated by three University of Cape Town professors, who mark according to a flexible mark plan which allows for specific circumstances that might apply to one company and not another. This mark plan is however not made public as it only forms a basis to start from and then professional judgement is used to determine the actual classifications of the companies. A second reason why the mark plan is not made public is that it might encourage competition among the various companies. The mark plan also changes from year to year to incorporate new accounting standards. Companies are rewarded for early

adoption of South African standards and also for compliance with International Financial Reporting Standards (IFRS) (Excellence in Financial Reporting, 2002).

The mark plan used is divided into four categories. Firstly, performance review, which deals primarily with non-statutory matters, overall review of the nature of the business and its performance and an explanation of the business environment. The performance review need not be confined to the year under review and should include ratios and growth rates. All corporate governance disclosure falls within this category. The performance review section has approximately a weighting of 35 % (Excellence in Financial Reporting, 2002).

The second category is financial disclosure. This category focuses on good accounting and clear understandable reporting. Specific accounting issues that are a result of new standards and which can significantly affect the reported profit and/or balance sheet relationships are included in the mark plan. Adjudicators have found in the past, companies tend not to comply fully with newly issued statements and therefore credit is given just for compliance with new standards. The way in which accounting statements are applied is also taken into account. This section contributes 35 % towards the overall weighting (Excellence in Financial Reporting, 2002).

The third section deals with forward-looking information. This section recognises that historical information is a useful base to make forecasts. Credit is given if the forecasts made have been evaluated against the risks of the company. Therefore points are given for information regarding financial and other risks as well as indicators of long-term financial targets. Credit is also given for industry and market-related information. The forward-looking information has a weighting of around 20% (Excellence in Financial Reporting, 2002)

The last category looks at presentation and is the smallest section. This section is subjective and allows for the adjudicator's impression of layout, graphics and the readability of the annual

financial statements. This section has a weighting of less than 10% (Excellence in Financial Reporting, 2002).

The report for each year ranks the top ten companies and the remaining 90 companies are divided into four categories namely, excellent, good, adequate and unsatisfactory. The companies are however not ranked in the four different classifications. This study will be using the raw disclosure scores as a measure for the disclosure level of each of the top 100 companies.

### **3.4. INDEPENDENT VARIABLES: MARKET BETA**

Market beta is included in the above model to take into account market volatility (Gebhardt, Lee and Swaminathan, 2000). A firm's beta measures the systematic risk of a company, which is market risk attributable to common macroeconomic factors that all firms face (Bodie, Kane and Marcus, 1999). Beta measures the sensitivity of a share price to movements of the market as a whole (Bodie, Kane and Marcus, 1999). The higher beta is the more sensitive that particular share is to changes in the market.

Only systematic risk has been taken into account as unsystematic risk will be diversified away in a portfolio of assets and would therefore have no effect on the cost of equity capital.

The Capital Asset Pricing Model (CAPM) suggests that a firm's beta will be positively correlated with cost of equity capital and therefore needs to be included in the model. CAPM states that a firm's cost of equity capital is a function of the risk free rate, firm's beta and the market risk premium (Ross, Westerfield, Jordaan and Firer, 1996). Therefore if beta were left out of the model it would distort the results. Both beta and leverage have been included in the model as they are each correlated with the cost of equity capital. However beta and leverage



may also be correlated with each other. Therefore when performing the multiple regression analysis an adjustment will be made to take into account this multicollinearity.

The beta values used in this study are calculated by The Financial Risk Services. The Financial Risk Services is based on American and United Kingdom experience and is part of an on-going research programme at the University of Cape Town, South Africa (Financial Risk Services, 2002).

Betas are calculated by regressing the monthly returns for a share against the corresponding monthly returns for the JSE Actuaries All Share Index. Beta will then be the slope of the regression line (Ross, Westerfield, Jordaan and Firer, 1996). The Financial Risk Service implements two refinements in their calculation of beta. Firstly, they implement the Bayesian adjustment, which takes into account prior information of betas (Financial Risk Service, 2002). This adjustment reduces the loss of accuracy and efficiency in estimating beta (Bowie and Bradfield, 1993).

The second adjustment is implemented to overcome the problem of thin trading. Thin trading arises when a company's share is not regularly traded on the securities exchange. Ball (1977) Scholes and Williams (1977) were two of many authors that investigated the effect of thin trading on beta estimations. They concluded that betas are susceptible to bias in thinly traded markets. Therefore the Financial Risk Service implements a trade-to-trade procedure to overcome the problem of thin trading on the JSE Securities Exchange (Financial Risk Service, 2002).

### **3.5. INDEPENDENT VARIABLES: FIRM SIZE**

The third independent variable is firm size. Firm size is important as more information is readily available for larger firms than smaller firms, and therefore firm size can be used as a proxy for the level of information available (Banz, 1981; Gebhardt, Lee and Swaminathan, 2000). The risk of investing in a company increases when there is less information about that particular company. The increase in risk could potentially increase the firm's cost of equity capital. This study will use market value of a firm's shares as a proxy for firm size.

Botosan (1997) states there is a significant relationship between market value and the cost of equity capital, as well as between market value and disclosure levels. Therefore if it were left out of the model it would be a correlated omitted variable. As larger firms provide more information and therefore have a lower risk attached to them, it can be expected that larger firms will have a lower cost of equity capital than a smaller firm. This results in an estimated negative relationship between market value and the cost of equity capital.

The sample of this study consists of the top 100 companies on the JSE Securities Exchange. Even though the sample only consists of the largest 100 companies there is still merit in firm size as an independent variable as there is a large variation in size of companies in the sample. The largest company in the sample has a market capitalisation of R269 billion and the smallest company has a market capitalisation of R320 million. Therefore as there is a large variation one would expect that this variable would have an impact on the cost of equity capital.

### **3.6. INDEPENDENT VARIABLES: FINANCIAL LEVERAGE**

The final independent variable used in the model to explain the cost of equity capital is financial leverage. Financial leverage is included as, according to Modigliani and Miller, a firm's cost of equity capital should be positively related to the amount of debt in the firm's capital structure. This relationship holds as the more debt a company takes on, the more likely it will be that the company will face bankruptcy costs and therefore the firm will be more risky for an investor. Leading on from this, the more risky a company is the higher the required rate of return will be. Consequently the more debt a firm has, the more risky it is and therefore the firm's cost of equity capital is estimated to be higher. However beta and leverage may also be correlated with each other. Therefore when performing the multiple regression analysis an adjustment will be made to take into account this multicollinearity.

### **3.7. SAMPLE SELECTION**

The sample consists of the top 100 companies on the JSE Securities exchange included in the excellence in financial reporting survey for the years 1999 to 2003. As only the top 100 companies are included there may be selection bias in the sample. The financial reporting survey is performed at 31 October each year and published in the subsequent year. The excellence in financial reporting started in 1997, however the method used for 1997 and 1998 were different to subsequent years and have therefore been ignored. Therefore the sample years are 1999 until 2003, resulting in a 500 firm-year end sample.

### **3.8. DATA**

The following section will set out exactly what data sets are required and at which date these data points are taken for this study.

#### **3.8.1. Dependent Variable: Cost of Equity Capital**

The cost of equity capital is calculated six months after the year end to ensure that all publicly available information from the particular year end is included in the cost of equity capital. Botosan (1997), Botosan and Plumlee (2001), Richardson and Welker (2001) and Hail (2001) have all applied this approach in their respective studies.

In order to calculate the cost of equity capital the following data points are used for each firm:

- Earnings forecasts for the 2 subsequent years, six months after the year end for each company in the sample. Earning forecast figures are obtained from Reuters.
- Share prices six months after the year end. These were obtained from McGregors.
- Book value of equity at the beginning of the financial year end was obtained from the published annual financial statements.
- The dividend payout ratio for each firm was obtained from BFA McGregors.
- The average return on equity for the ALSI for the last five years was obtained from BFA McGregors.

### 3.8.2. Independent Variables

#### 3.8.2.1. Disclosure Scores

The disclosure scores are obtained from the Excellence in Financial Reporting analysis performed each year. As the mark plan varies across the different years in the sample and certain marks available are not applicable to all companies, the disclosure scores need to be standardised. In order to achieve this, disclosure scores were divided by the total number of marks available each year. If a certain number of marks were not applicable to a certain company, these were subtracted from the total available. The following equation illustrates the adjustment made:

$$STD\_DISC_t = DISC_t / (TOTAL_t - N/A) \quad \text{Equation 7}$$

Where: STD\_DISC = Standardised Disclosure Score  
DISC = Disclosure Score from the Excellence in Financial Reporting analysis  
TOTAL = Total number of marks available for year t  
N/A = The number of marks that were not applicable for that particular company

Cooke (1998) suggests that the original disclosure scores should not be used in a disclosure study, as the theoretically correct relationship between the independent and dependent variables are not known. Thus interpreting the significance of a study using the disclosure scores would be problematic. Cooke (1998) suggests three transformations of the disclosure scores to improve the interpretation of regression analysis results:

### 1. *The Rank Regression Approach*

This procedure ranks the disclosure scores in ascending order. The advantages of the rank transformation include: no need to standardise, log or undertake any power transformation as it results in the same rank, the ranks are insensitive to outliers, useful when the relationship between the dependent and independent variable is not strictly linear and there is no basis for suggesting a relationship. The disadvantages highlighted by Cooke (1998) are that it is difficult to test the significance of the estimated coefficients in multiple regression analysis and that the data after transformation are ordinal rather than interval.

### 2. *Normal Scores Approach*

This method is an extension of the rank regression approach. The ranked disclosure scores are substituted by the scores in the normal distribution. The main advantage of the approach is that significance levels can be interpreted more accurately using the t and F-tests.

### 3. *Log of the odds ratio Approach*

This method assumes that the assumptions of linear regression hold. There is a problem in disclosure studies in that the disclosure scores are bounded between zero and 100%. One method to overcome this problem is to use the log of the odds ratio. The disclosure scores are transformed by as follows:

$$\ln [\text{DISC} / (1-\text{DISC})] \quad \text{Equation 8}$$

This approach will ensure that the range of transformed disclosure scores follows the normal distribution.

This study will be applying a modification of the rank regression method suggested by Cooke (1998). A fractional rank of the disclosure score will be calculated. By using the fractional rank testing the significance of the estimated coefficient and interpretation of the results is made easier, thereby overcoming the shortfalls identified by Cooke (1998). This method has previously been used by Botosan (1997), Botosan and Plumlee (2001), Richardson and Welker (2001) and Hail (2001).

In order to calculate the fractional ranks, the firms in the sample are ranked in ascending order so that the firm that provided the highest level of disclosure will receive the highest rank. Therefore if greater disclosure results in a lower cost of equity capital there should be a negative relationship. The fractional rank will then be the rank of the firm divided by the number of observations for that year.

#### **3.8.2.2. Beta values, Market Capitalisation and Financial Leverage**

Beta values six months after the year end are obtained from the Financial Risk Services. Market capitalisation is taken at the end of the particular year end. Market capitalisation is calculated by multiplying the number of shares issued by the closing share price. Share prices can be assumed to be normally distributed due to the random walk principle (Ross, Westerfield, Jordaan and Firer, 1996). However the number of shares can not be assumed to be normally distributed. Therefore to adjust for this the natural log of the market capitalisation values are taken. Finally, financial leverage is taken at the financial year end and calculated on the book values of both equity and debt.

### 3.9. MAIN HYPOTHESIS TEST

The main test of this study will look to regress the model depicted in *Equation 1* for the 5 year sample. Market conditions across the five year period may be different and therefore dummy variables are included to account for this.

Dummy variables (D00, D01, D02 and D03) have been included in the above model for the different years of each observation. The base category for the dummy variables is the year 1999. All the other years have been assigned a dummy variable with a value of 1 if the year corresponds to that dummy variable. For example if the observation is in the year 2003, D03 will be assigned with value of 1 and all the other dummy variables are assigned a value of zero. Not including the dummy variables may result in excluding an explanatory variable. *Equation 1* will now include the dummy variables and is described as follows:

$$\text{COE}_{it} = \alpha + \beta_1 \text{BETA} + \beta_2 \text{LMVAL} + \beta_3 \text{LEV} + \beta_4 \text{DRANK} + \beta_5 \text{D00} + \beta_6 \text{D01} + \beta_7 \text{D02} + \beta_8 \text{D03} \quad \text{Equation 9}$$

Where:  $\alpha$  = Constant variable

$\text{COE}_{it}$  = Expected cost of equity capital for firm i in year t

BETA = Market beta for the firm

LMVAL = Natural log of the market value

LEV = Financial leverage

DRANK = Disclosure rank

D00 = Dummy Variable for year 2000

D01 = Dummy Variable for year 2001

D02 = Dummy Variable for year 2002

D03 = Dummy Variable for year 2003



The first test performed is simple ordinary least squares regression. This regresses the cost of equity capital separately against each of the four independent variables, namely beta, market capitalisation, leverage and disclosure ranks. The calculated Pearson correlations coefficients will give an indication if there is any relationship between these variables and the cost of equity capital.

The next step is to carry out a multiple ordinary least squares regression analysis in which the cost of equity capital is regressed against all four independent variables including the dummy variables. This allows for interactions between the independent variables. The expected relationships are that beta should have a positive relationship, market value should have a negative relationship, financial leverage should have a positive relationship and fractional disclosure rank should have a negative relationship with the cost of equity capital.

The multiple regression analysis will be performed for both the overall disclosure rank (Hypothesis 1), as well as each of the four components of the disclosure score (Hypothesis 2).

### 3.10. DIAGNOSTIC TESTING

In interpreting the results of the ordinary least squares regression analysis certain assumptions have to hold in order for the inferences to be valid. The following assumptions need to be met: (Allison, 1999; Chatterjee, Hadi and Price, 2000; Sen and Srivastava, 1990)

1. **Linearity** - The dependant variable  $y$  is a linear function of the independent variables  $x$ 's and the random residual term  $\varepsilon$ . In order to check for linearity the following plots of the standardised residuals will be used:

- Scatter plot of the standardised residuals against each of the independent variables.

Under the standard assumptions the standardised residuals are uncorrelated with each of

the independent variables. If this assumption holds then this scatter plot will be a random scatter of points.

- Scatter plot of the standardised residuals versus the fitted values. Under the standard assumptions the standardised residuals are also uncorrelated with the fitted values. Therefore this plot should also show a random scatter of points.

2. **Mean Independence** – The residual terms have a mean, or average value, of zero.
3. **Homoscedasticity** – The residual terms have the same variance  $\sigma^2$ . This is the constant variance assumption. When this assumption does not hold the residuals are said to exhibit heteroscedasticity, which means that the degree of random noise in the linear equation varies with the values of  $x$ .

Heteroscedasticity does not produce any bias in the coefficient estimates, but it does have the following two consequences:

- *Inefficiency* – The least squares estimates do not have minimum standard errors. This indicates that an alternative method may produce a better result. Ordinary least squares is not optimal when there is heteroscedasticity as it gives equal weightings to all observation, however observations with a larger variance contains less information than observations with a small variance. This can be solved using a weighted least squares method.
- *Biased standard residuals* – If heteroscedasticity is present the standard residuals can be biased. This will lead to bias in test statistics and confidence intervals. This problem can be corrected by using a robust standard error. This method will not change the coefficient estimates and therefore will not solve the problem of inefficiency. However this method will provide reasonably accurate probability values. This method is preferred over the weighted least squares method as fewer assumptions are required (Allison, 1999:127).

Heteroscedasticity can be detected by using graphs and statistical tests. The two scatter plots discussed under the assumption of linearity can also be used to detect heteroscedasticity. A statistical test that can be used is the White test.

4. **Independent Residuals** – This assumption assumes that the residuals are independent of each other. When this assumption does not hold a problem of autocorrelation exists. The consequences of autocorrelation are identical to those of heteroscedasticity. The only difference is that the bias in the standard residuals will almost always be biased downwards resulting in less accurate coefficients. This will in turn result in test statistics that will be biased upwards resulting in concluding that relationships exist when they do not.

Autocorrelation can be detected by using the Durban-Watson test which will conclude whether there is either positive autocorrelation, negative autocorrelation or inconclusive. Another statistical test Breusch-Godfrey Serial Correlation LM Test available on E-Views will also be used.

To adjust for autocorrelation the Cochrane-Orcutt procedure can be used. This method works as follows:

- Estimate the ordinary regression:  $Y_t = \alpha + \beta x_t + u_t$
- Use the residuals from the 1<sup>st</sup> step to run a regression of the following equation to derive an estimate of  $\rho$ :  $u_t = \rho u_{t-1} + e_t$
- Use this estimate of  $\rho$  to transform the original variables in the following equation:  

$$Y_t - \rho Y_{t-1} = \alpha (1-\rho) + \beta (x_t - \rho x_{t-1}) + u_t - \rho u_{t-1}$$
- Estimate the transformed regression to obtain an estimate of  $\beta$ :  

$$Y_t^* = \alpha^* + \beta x_t^* + e_t$$
  
 where  $Y_t^* = Y_t - \rho Y_{t-1}$  and  $x_t^* = x_t - \rho x_{t-1}$  and  $\alpha^* = \alpha (1-\rho)$

The above adjustment can be carried out step by step, however E-views has an automatic adjustment which performs the above adjustment in the background. To adjust for autocorrelation using E-Views the function AR(1) is added to the end of the regression expression. This would adjust for first order autocorrelation.

5. **Normality Assumption** – The residuals are assumed to have a normal distribution. The criteria of that the residuals are not biased and are efficient does not depend on this assumption. If the sample size is large enough, one may be able to use ordinary least squares regression even if the residuals are not normally distributed according to Srivastava's (1971) theorem which is proved using the central limit theorem proved by Gnedenko and Kolmogorov (1954) (Sen, Srivastava, 1990:106-109).

The normality assumption may be detected using the following techniques:

- Graphical methods including a histogram
- Statistical methods including: Jarque-Bera test, Lilliefors test and Chi-squared test of normality.

### 3.11. TESTING VALIDITY OF VARIABLES

The validity of the estimated cost of equity capital values and the ranked disclosure scores are tested to determine whether they are appropriate to be used in the study. The following two sections detail the respective validity tests.

#### 3.11.1. Test validity of Cost of Equity Capital

The first variable that is tested for validity is the estimate of the cost of equity capital. A valid estimate for the cost of equity capital should be increasing in risk, which is measured by beta

(Botosan, 1997). This relationship holds because as risk increases investors will require a higher return and in turn this should increase the cost of equity capital. Secondly, the cost of equity capital should also have a negative relationship with the size of a firm as measured by the market capitalisation of that firm (Botosan, 1997). As the size of the firm increases more information is produced and therefore the estimation risk around the firm decreases. As the risk decreases so should the required rate of return of the investors and consequently the cost of equity capital should also decrease. The last relationship that should hold is that with the financial leverage of the firm. The greater the use of debt in a firm, the greater the risk of bankruptcy is (Ross, Westerfield, Jordaan and Firer, 1996). As the risk increases so should the required rate of return and as a result the cost of equity capital should be increased.

Therefore in order to test the validity of the cost of capital estimates the following equation will be regressed.

$$r_{it} = \alpha + \beta_1 \text{BETA} + \beta_2 \text{LMVAL} + \beta_3 \text{LEV} \quad \text{Equation 10}$$

Where:  $r_{it}$  = Expected cost of equity capital for firm i in year t

BETA = Market beta for the firm

LMVAL = Natural log of the market value

LEV = Financial leverage

In order for the cost of equity capital estimates to be valid, the following relationships should hold: a positive relationship with beta, a negative relationship with market value and a positive relationship with financial leverage.

### 3.11.2. Test validity of Disclosure Scores

The second variable that is tested for validity is the disclosure score. In assessing the validity of the disclosure rank certain relationships should hold. Ahmed (1995) provides an analysis of 23 separate studies of the relationship between disclosure and firm characteristics. He finds that the following four variables have a statistically significant positive association with disclosure level: firm size, exchange listing status, audit firm size and leverage. Botosan (1997) used the above characteristics in assessing the validity of her disclosure score, whilst Hail (2001) used the number of analysts following a firm and the average return over the last five years for the firm. Richardson and Welker (2001) assessed the validity of their disclosure index by examining the relationship between firm size, financial performance, leverage and analyst following.

This study will combine all these approaches and assess the validity of the disclosure ranks by examining the relationship with firm size as indicated by market capitalisation, financial performance as indicated by the average return over five years, listing status which is whether they are listed on a foreign exchange, financial leverage and audit firm size which is whether their audit firm is one of the big four or not. In order to test these relationships the following regression equation will be tested.

$$\text{DRANK} = \alpha + \beta_1 \text{RETURN} + \beta_2 \text{LMVAL} + \beta_3 \text{LEV} + \beta_4 \text{LIST} + \beta_5 \text{AUDIT} \quad \text{Equation 11}$$

Where: DRANK = Expected cost of equity capital for firm i in year t

RETURN = Average return for a company over the last 5 years

LMVAL = Natural log of the market value

LEV = Financial leverage

LIST = Listing status (1=listed on foreign exchange; 0=otherwise not)

AUDIT = Audit status (1=audited by one of the big 4; 0=otherwise not)

The data for the validity testing of the disclosure scores was obtained from the following sources:

- The average return for each company is obtained from BFA McGregor
- Market values were obtained from BFA McGregor
- Financial leverage was calculated using the published financial statements
- The listing status was obtained from BFA McGregors
- The audit status was obtained from BFA McGregors.

In order for the disclosure index to be valid, the relationships yielded from the regression analysis should reveal a positive relationship between all the firm characteristics and the disclosure indexes.

### **3.12. ALTERNATIVE TESTING**

Alternative tests are performed to ensure that the results of the original regression analyses are robust and that similar results are achieved.

#### **3.12.1. Simultaneity Problem**

The first alternative test addresses the fact that a simultaneity problem might exist. Welker (1995), Harris and Muller (1999) and Leuz and Verrecchia (2000) all suggest that there might be a simultaneity problem when assessing the relationship between the cost of equity capital and disclosure levels. This problem exists as, when a firm considers what disclosure they are going to provide they take into account all the costs and benefits. One of these costs is the cost of equity capital. In turn this study is purporting that the cost of equity capital is determined by the disclosure the firm provides. Therefore a circular cause and effect relationship exists. To

overcome this Hail (2001) employs a two stage least squares regression. This involves firstly regressing the disclosure rank according to the following equation:

$$\text{DRANK}(P) = \alpha + \beta_1 \text{RETURN} + \beta_2 \text{LMVAL} + \beta_3 \text{LEV} + \beta_4 \text{LIST} + \beta_5 \text{AUDIT} \quad \text{Equation 12}$$

The next step is to determine a predicted disclosure rank for each firm using the regression equation determined above. This predicted disclosure rank is then substituted into the main equation, which is as follows:

$$\text{COE}_{it} = \alpha + \beta_1 \text{BETA} + \beta_2 \text{LMVAL} + \beta_3 \text{LEV} + \beta_4 \text{DRANK}(P) \quad \text{Equation 13}$$

This equation is then regressed with the predicted disclosure ranks from the first step and not the original disclosure ranks.

### 3.12.2. Use of alternative measures for the disclosure scores

The second alternative test would be to replace the fractional disclosure ranks with the different transformations of the disclosure scores. Four different variations of the disclosure scores will be used. Namely, the actual disclosure scores, the overall disclosure ratings disclosed to the market, the normal scores transformation and the log of the odds ratio transformation. The normal scores approach and the log of the odds ratio transformation are discussed in Section 3.8.2. The study will be trying to establish whether these will impact the results of the regression analysis or not.



### **3.12.3. Use of Fractional Ranks for all variables**

Another alternative test would be to determine the fractional ranks of all the other variables being: the cost of equity capital, beta, market value and leverage. This is considered as the variables in the original regression are all cardinal variables except for the disclosure score, which is ranked. These ranked variables will then be regressed. Again the study will be looking for any variation in the finding of the regression analysis.

### **3.12.4. Regression Analysis for each year**

This study is looking at five years of data. The original test pools all five years of data together. As a firm might appear in more than one year, these observations may not be independent and autocorrelation may exist (Richardson and Welker, 2001). Therefore the study will look at each year separately to determine whether a different result will be determined.

### **3.12.5. Regression Analysis according to Company Year End**

The firms used in the sample all have different year ends. Therefore the sixth alternative test will be testing whether there is a different relationship between the cost of equity capital and disclosure depending on when the year end of a company is.

### **3.12.6. Regression Analysis according to Industry Sector**

The firms included in the sample also come from different industries and this alternative test will test whether there is a different relationship for the different industries. This is of interest

as some industries might be driven by different factors and this in turn will impact the relationship between the cost of equity capital and disclosure differently.

### 3.12.7. CAPM as an estimate for the Cost of Equity Capital

The cost of equity capital was originally estimated using the residual income model. An alternative test would be to estimate the cost of equity capital using Capital Asset Pricing Model (CAPM) and then perform the original regression analysis. This alternative test could indicate differences in the estimate of the cost of equity capital if the results differ.

CAPM defines the cost of equity capital as the sum of the risk free rate and the product of the firm's market beta and the expected market risk premium (Ross, Westerfield, Jordan and Firer, 1996). The CAPM model is defined according the following formula:

$$COE = R_f + \beta (R_m - R_f) \quad \text{Equation 14}$$

Where:  $R_f$  = Risk free rate in the market  
 $B$  = Market beta for the firm  
 $(R_m - R_f)$  = Estimated market risk premium

The proxy used for the risk free rate in the South African market is the 91 day Treasury Bill Rate as suggested by Firer and McLeod (1999) and Ross, Westerfield, Jordan and Firer (1996). The 91 day Treasury Bill Rate was obtained from the South African Reserve Bank Quarterly Bulletins and the beta values for each company are calculated by The Financial Risk Services.

The value of the market risk premium on the JSE Securities Exchange has been estimated by Favish and Affleck-Graves (2002) as 12.3% for the years 1960 to 1985. Extending this research

Firer and Staunton (2002) estimate the South African market risk premium to be 8.2% for the years 1900 to 2001. Bradfield, Firer and Abrahams's (2002) research also indicates a market risk premium of 7.7% for the last 50 years and a long term risk premium of 9.5%. This study uses an average of all the previous research findings, except Favish and Affleck-Graves (2002) estimate as this was only until 1985 and the South African market has significantly changed since then. Therefore a market risk premium of 8.47% is used.

The results of the main hypothesis test and each of the alternative tests are provided in the following chapter.

## 4. EMPIRICAL RESULTS

The sample selected for testing the relationship between disclosure levels and the cost of equity capital included the top 100 companies on the JSE Securities Exchange for the years 1999 to 2003. The original sample consisted of 500 firm year ends, however the final number of observations used in the study was reduced due to data restrictions and omissions. The following table details the derivation of the sample selected.

**TABLE 1**  
**Derivation of Sample Size**

Year	1999	2000	2001	2002	2003	Total
Original Sample Size	100	100	100	100	100	500
No Earnings forecast information	(18)	(9)	(8)	(11)	(10)	(56)
Incomplete data set	(11)	(9)	(7)	(2)	(1)	(27)
Final Sample Size	71	82	85	87	89	414

The original sample of 500 firm year ends was reduced by 56 observations due to the lack of earnings forecast information that was required to estimate the cost of equity capital. A further 27 observations were omitted due to incomplete market data being available. Due to both these factors the final sample size used in this study is 414 firm year ends.

#### 4.1. DESCRIPTIVE STATISTICS AND CORRELATION ANALYSIS

Table 2 below presents sample statistics of the variables used to test hypothesis one. The descriptive statistics detailed below are for the total sample, including any outliers. The table shows that the mean disclosure score is 47.72%. There is considerable dispersion in the scores, as illustrated by the minimum and maximum values of 7.94% and 80.2% respectively, and the standard deviation of 13.55. The average market capitalisation of the companies included in the sample is R12.84 billion. However, there is a wide range of variation in the sample as indicated by the maximum (R269 billion) and the minimum (R320 million) market capitalisations. The large variation in the disclosure scores could be due to the large variation in the company sizes, as larger firms are thought to produce more information. The average cost of equity capital, as estimated by the residual income approach, is 9.46% and also exhibits a large variation in the estimates. After removing the outliers the average cost of equity capital increases to 12.36%.

**TABLE 2**  
**Summary Statistics and Variable Definitions**

##### *Summary Statistics*

	Observations	Mean	Std. Dev.	Median	Minimum	Maximum
COE	414	9.46	4.15	9.17	0.77	36.87
DISC <sup>a</sup>	414	47.72	13.55	46.94	7.94	80.2
DRANK	414	0.51	0.29	0.5	0.00	1.00
BETA	414	0.89	0.32	0.88	-0.43	2.04
LEV	414	2.57	5.42	0.95	0.00	49.86
MVAL <sup>a</sup>	414	12.84	24.23	4.29	0.32	269.00
LMVAL	414	15.56	1.16	15.28	12.68	19.41

##### *Variable definitions*

COE	=	Estimated cost of equity capital using the residual income approach
DISC	=	Absolute disclosure scores as a percentage
DRANK	=	Fractional rank of the firm's disclosure scores
BETA	=	Estimate of the systematic risk of a company. Beta measures the sensitivity of a share price to movements of the market.
LEV	=	Financial leverage of the company
MVAL	=	Market value of equity in R billions.
LMVAL	=	Natural log of the market value of equity

<sup>a</sup> DISC and MVAL information is provided only for sample characteristics. In the regression the fractional rank of DISC and the natural log of MVAL is used.

Table 3 below provides the Pearson correlation coefficients between cost of equity capital, fractional disclosure rank, beta, leverage and the natural log of market capitalisation. All variables are calculated as discussed in Chapter 3. The correlation between COE and DRANK is -0.0395, which indicates that there is a negative association between the cost of equity capital and disclosure levels. However this is not statistically significant and therefore no conclusion can be reached. Cost of equity capital is positively correlated to leverage and negatively correlated with the market value of equity, which is consistent with the hypothesised relationships. The only variable which does not at this preliminary stage exhibit the predicted relationship is beta. This will be explored in greater detail in the discussion of the validity of the estimate of the cost of equity capital.

**TABLE 3**  
**Pearson Correlation Coefficients <sup>a</sup>**

	COE	DRANK	BETA	LEV	LMVAL
COE	1.0000 (0.0000)				
DRANK	-0.0395 (>0.8000)	1.0000 (0.0000)			
BETA	-0.1156 (0.0200)	-0.0488 (0.4000)	1.0000 (0.0000)		
LEV	0.0009 (>0.8000)	0.1353 (0.0100)	0.0863 (0.1000)	1.0000 (0.0000)	
LMVAL	-0.2145 (>0.001)	0.2749 (>0.001)	0.2133 (>0.001)	0.2113 (>0.001)	1.0000 (0.0000)

<sup>a</sup> p-values for two-tailed test of statistical significance are provided in parentheses.  
Variables are defined in Table 2.

## **4.2. VALIDITY TESTING OF VARIABLES**

### **4.2.1. Disclosure Scores**

The disclosure scores developed in terms of the Excellence in Financial Reporting competition are used as a proxy for the level of disclosure provided by the annual financial statements. The Excellence in Financial Reporting develops disclosure scores on an annual basis for the top 100 companies on the JSE Securities Exchange. The mark plan that is used each year is changed to incorporate any changes in the accounting standards and good corporate governance disclosure. The mark plan is also flexible to take into account specific circumstances that do not apply to a specific company.

As the mark plan varies between the years in the sample and companies, the disclosure scores are standardised by dividing the actual disclosure score by the total number of marks available less any not applicable .

Research on using accounting disclosure scores in regression analysis by Cooke (1998) revealed that using the actual disclosure scores may not be desirable as the theoretical correct form of the relation between the dependent and independent variable is not known. Cooke (1998) suggests three transformations of disclosures scores namely; rank regression procedure, normal scores approach and log of the odds ratio.

The current study uses the rank regression approach as the main transformation of the disclosure scores. The remaining two transformations will be performed to ensure that the results of the test are robust as discussed in Section 4.5.2. The disclosure scores are transformed by calculating the fractional disclosure scores for the sample. The fractional ranks are determined by ranking all the disclosure scores in ascending order and then dividing the ranks by the

number of observations in the sample. This approach has been used by Botosan (1997), Botosan and Plumlee (2001), Richardson and Welker (2001) and Hail (2001).

Previous research has shown that the disclosure level of a firm is positively correlated with firm size, leverage, exchange listing status, audit firm size, average return on equity and the number of analyst following the firm (Ahmed, 1995; Botosan, 1997; Hail, 2001; Richardson and Welker, 2001). The validity of the disclosure scores will be tested against all the above except audit firm size, as the majority of the firms in the sample are audited by one of the big 4 audit firms and therefore would not add any predictive value to the model. The number of analysts has also been excluded due to unavailability of data. Table 4 shows the results of the regression analysis on the disclosure scores.



**TABLE 4**  
**Regression of DRANK on Average return on equity, Market Value, Leverage and Exchange Listing Status**

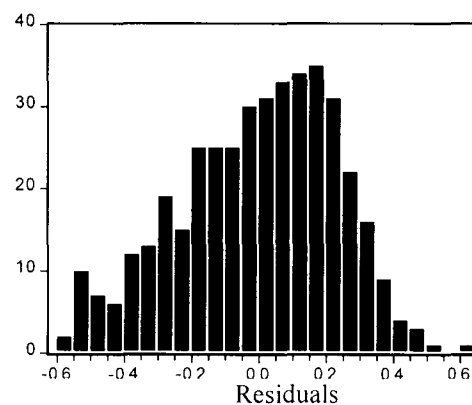
$$\text{DRANK} = \alpha + \beta_1 \text{RETURN} + \beta_2 \text{LMVAL} + \beta_3 \text{LEV} + \beta_4 \text{LIST}$$

Dependent Variable: DRANK  
Method: Least Squares  
Convergence achieved after 5 iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LMVAL	0.05769	0.01310	4.40413	0.00000
LEV	0.00309	0.00300	1.03095	0.30318
RETURN	0.09586	0.06625	1.44689	0.14871
LIST	0.08620	0.03083	2.79605	0.00542
$\alpha$	-0.45512	0.20091	-2.26529	0.02403
AR(1) <sup>b</sup>	0.46147	0.04427	10.42493	0.00000
R-squared	0.32497	F-statistic		38.80094
Adjusted R-squared	0.31659	Prob(F-statistic)		0.00000
S.E. of regression	0.23733			
Sum squared resid	22.70006			

Diagnostic Tests <sup>a</sup>		t-Statistic	Prob.
Mean Independence	Mean	-1.60E-12	
White Heteroskedasticity Test	Obs*R-squared	10.13343	0.18114
Breusch-Godfrey Serial	Obs*R-squared	1.08002	0.58274
Correlation LM Test			
Durbin-Watson stat	Test Statistic	1.95137	

Normality of residuals



<sup>a</sup> The above diagnostic tests reveal that there is no heteroscedasticity or autocorrelation. The residuals appear to be normally distributed as indicated by the residual histogram plot.

<sup>b</sup> AR(1) function added to adjust for first order autocorrelation.

Consistent with previous research LMVAL and LIST exhibit a positive and highly significant correlation with the disclosure quality. This follows as the quantity and quality of information for larger companies should be greater and companies listed on international security exchanges are expected to provide a greater level of disclosure. The RETURN variable is also positively correlated, however only at the 15% significance level. Only financial leverage does not have a significant positive relationship with disclosure levels. Overall, the validity of the disclosure scores are supported by the model as shown by a highly significant F-statistic with  $p=0.00000$  and an adjusted  $R^2$  of 31.7%. Therefore the disclosure scores developed by the Excellence in Financial Reporting exhibit the expected relationships with dependent variables and are therefore valid to use in this study.

#### **4.2.2. Cost of Equity Capital**

The cost of equity capital was estimated using the residual income model as discussed in Section 3.2.4 above. Using the residual income model the implied cost of equity capital is the rate that equates the intrinsic value of a firm to the current market price of the firm's share. The cost of equity capital is the rate that investors discount future expected residual income to arrive at the current market price of the firm's share.

The estimate for the cost of equity capital is calculated by determining the intrinsic value of the firm and setting this equal to the share price. The intrinsic value of the firm is estimated to be the sum of the current book value of equity and the present value of the residual income. In estimating the intrinsic value of the firm, a three-stage approach was used as follows:

Stage 1: The explicit earnings forecast for the two following years, obtained from Reuters were used to estimate the residual income. The third year of earning forecast was

determined by multiplying the second year earnings forecast by the long term growth rate obtained from McGregor BFA.

Stage 2: The residual income for the next nine years was determined by deriving the earning forecasts by linearly fading the return on equity after year three to the average market return. The average return on the ALSI for the past 5 years was used as a measure for the market return.

Stage 3: A terminal value was calculated by assuming the residual income in year 12 in perpetuity.

A valid measure of the cost of equity capital is expected to be increasing with risk as measured by market beta and financial leverage and also increasing with the size of the firm (Botosan, 1997; Ross, Westerfield, Jordan and Firer, 1996). In order to determine whether the estimated cost of equity capital is valid, the cost of equity capital was regressed against these variables. Table 5 below details the results from the regression analysis.

**TABLE 5**  
**Regression of COE on Beta, Market Value and Leverage**

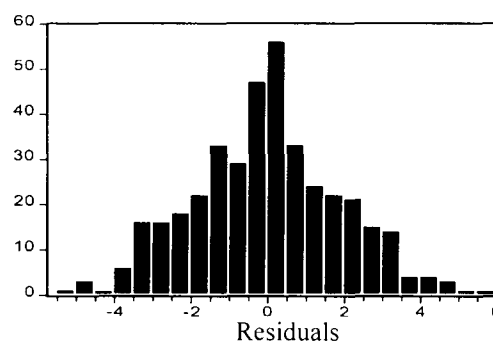
$$COE_{it} = \alpha + \beta_1 BETA + \beta_2 LMVAL + \beta_3 LEV$$

Dependent Variable: COE  
Method: Least Squares  
Convergence achieved after 6 iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BETA	0.112357	0.389976	0.288113	0.77340
LMVAL	-0.69512	0.112579	-6.17455	0.00000
LEV	0.054115	0.02539	2.131363	0.03370
D00	2.833089	0.263898	10.73554	0.00000
D01	2.26913	0.296416	7.655219	0.00000
D02	4.60533	0.315583	14.59308	0.00000
D03	3.128644	0.295301	10.59476	0.00000
$\alpha$	16.82257	1.731833	9.713734	0.00000
AR(1) <sup>b</sup>	0.492814	0.045043	10.94099	0.00000
R-squared	0.486072	F-statistic		45.04354
Adjusted R-squared	0.47528	Prob(F-statistic)		0.00000
S.E. of regression	1.95789			
Sum squared resid	1460.5			

Diagnostic Tests <sup>a</sup>		t-Statistic	Prob.
Mean Independence	Mean	2.64E-12	
White Heteroskedasticity Test	Obs*R-squared	12.40244	0.259025
Breusch-Godfrey Serial	Obs*R-squared	1.204964	0.547451
Correlation LM Test			
Durbin-Watson stat	Test Statistic	2.037177	

Normality of residuals



<sup>a</sup> The above diagnostic tests reveal that there is no heteroscedasticity or autocorrelation. The residuals appear to be normally distributed as indicated by the residual histogram plot

<sup>b</sup> AR(1) function added to adjust for first order autocorrelation.

The above regression analysis shows that COE is positively correlated with beta (systematic risk), however this is not statistically significant. This finding is contradictory to finance theory as beta reflects a firm's risk and as risk increases, it is expected that the required rate of return would increase. The results for the beta coefficient reveal a very high standard error in comparison to the t test statistic, which may be indicative of multicollinearity between beta and one or more of the other independent variables. As multicollinearity exists the t-statistics for beta will be small and the interpretation of the significance of the variable can not be determined reliably. Further testing was performed to determine whether the inclusion of beta in the model explains more of the variance as indicated by the R-squared factor. The results indicated that the inclusion of beta on the model increased the amount of variation explained by the model and therefore beta is a significant variable. It must therefore be concluded that beta is significant; however the test statistic in the above table can not be reliably interpreted due to the existence of multicollinearity.

The above regression analysis also reveals a negative relationship between COE and the log of the market value, which is highly significant ( $p = 0.00000$ ). Therefore as the size of the firm increases the cost of equity capital will decrease. A significant positive relationship ( $p = 0.03370$ ) between COE and financial leverage exists. This implies that as the financial leverage increases the cost of equity capital increases. Leverage can be used as a proxy for risk, hence as the risk increases in a company its cost of equity capital will increase.

Dummy variables (D00, D01, D02 and D03) have been included in the above model for the different years of each observation. The base category for the dummy variables is the year 1999. All the other years have been assigned a dummy variable with a value of 1 if the year corresponds to that dummy variable. For example if the observation is in the year 2003, D03 will be assigned with value of 1 and all the other dummy variables are assigned a value of zero. The dummy variables were included as the sample contains observations from different years

and the market conditions may be very different from year to year. Therefore not including the dummy variables may result in the exclusion of an explanatory variable.

By including the dummy variables in the regression analysis the adjusted  $R^2$  value increased from 15.4% to 47.528%, thus indicating that more of the variation of COE can be explained. The dummy variables all have t-statistic with a probability of  $p = 0.00000$ , which is highly significant. This indicates that the cost of equity capital for all the years in the sample is significantly different from the base year of 1999 and from each other and therefore need to be included in the model.

Overall, the results support the validity of the cost of equity capital. The adjusted  $R^2$  of 47.528% indicates that just below half of the variation in COE is explained by the above regression. The next section examines the effect of expanding the model to include the effect of disclosure levels.

### 4.3. EMPIRICAL ANALYSIS OF HYPOTHESIS ONE

Hypothesis one is tested by regressing cost of equity capital on fractional disclosure rank, market beta, natural log of the market value and financial leverage as defined by the model:

$$COE_{it} = \alpha + \beta_1 BETA + \beta_2 LMVAL + \beta_3 LEV + \beta_4 DRANK \quad \text{Equation 15}$$

Where:  $COE_{it}$  = Expected cost of equity capital for firm i in year t

BETA = Market beta for the firm

LMVAL = Natural log of the market value

LEV = Financial leverage

DRANK = Fractional disclosure rank

Beta and leverage have been included in the model to account for a firm's systematic and financial risk. As both these risks increase it is expected that the cost of equity capital will increase to compensate investors for the increased risk. Market value has been included as earlier regression analyses show a highly significant relationship with cost of equity capital and disclosure levels. It is expected that larger firms produce more information and therefore have less risk resulting in a reduced cost of equity capital.

Equation 15 was regressed on the total sample of 414 observations. The results revealed a negative association between cost of equity capital and disclosure levels, however, this was highly insignificant ( $p = 0.99600$ ). The ordinary least squares regression assumptions of no autocorrelation and normal residuals were also not met. The regression analysis was reperformed adjusting for the autocorrelation and eliminating the cost of equity capital outliers, the results are provided in Table 6.

**TABLE 6**  
**Regression of COE on Beta, Market Value, Leverage and Fractional Disclosure Rank**

$$COE_{it} = \alpha + \beta_1 BETA + \beta_2 LMVAL + \beta_3 LEV + \beta_4 DRANK + D00 + D01 + D02 + D03$$

Dependent Variable: COE

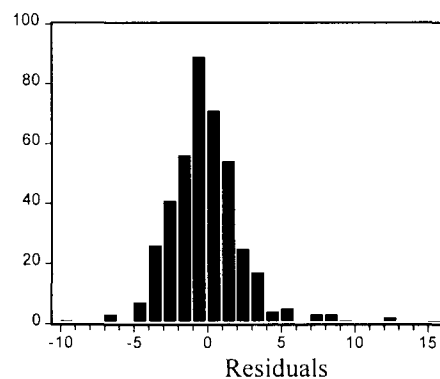
Method: Least Squares

Convergence achieved after 7 iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DRANK	1.178177	0.624539	1.886474	0.0600
BETA	0.445886	0.523226	0.852186	0.3946
LMVAL	-1.104815	0.151920	-7.272327	0.0000
LEV	0.066776	0.033721	1.980286	0.0484
D00	2.513721	0.377973	6.650527	0.0000
D01	1.748653	0.452850	3.861436	0.0001
D02	4.613765	0.465468	9.912092	0.0000
D03	3.170169	0.409704	7.737700	0.0000
$\alpha$	22.77281	2.293895	9.927573	0.0000
AR(1) <sup>b</sup>	0.459571	0.044896	10.23629	0.0000
R-squared	0.409548	F-statistic		30.75038
Adjusted R-squared	0.396229	Prob(F-statistic)		0.000000
S.E. of regression	2.656534			
Sum squared resid	2815.813			

Diagnostic Tests <sup>a</sup>		t-Statistic	Prob.
Mean Independence	Mean	7.96E-12	
White Heteroskedasticity Test	Obs*R-squared	10.32811	0.587200
Breusch-Godfrey Serial	Obs*R-squared	0.879336	0.644250
Correlation LM Test			
Durbin-Watson stat	Test Statistic	2.039901	

Normality of residuals



<sup>a</sup> The above diagnostic tests reveal that there is no heteroscedasticity or autocorrelation. The residuals appear to be normally distributed as indicated by the residual histogram plot

<sup>b</sup> AR(1) function added to adjust for first order autocorrelation.



The coefficients for BETA and LEV exhibit the expected positive relationship with the cost of equity capital. Leverage is significant at the 4.84% level thereby suggesting that there is a relationship between financial risk and the cost of equity capital for the South African market. Beta is however not significant and therefore no conclusions can be reached that beta influences the cost of equity capital in the model. The results for the beta coefficient reveal a very high standard error in comparison to the t test statistic, which may be indicative of multicollinearity between beta and one or more of the other independent variables. As multicollinearity exists the t-statistics for beta will be small and the interpretation of the significance of the variable can not be determined reliably. Further testing was performed to determine whether the inclusion of beta in the model explains more of the variance as indicated by the R-squared factor. The results indicated that the inclusion of beta on the model increased the amount of variation explained by the model and therefore beta is a significant variable. It must therefore be concluded that beta is significant; however the test statistic in the above table can not be reliably interpreted due to the existence of multicollinearity.

Log of the market value is highly significant ( $p = 0.00000$ ) with the cost of equity capital. This implies that as the size of a firm increases more information will be available and thereby reducing the risk of the firm resulting in the cost of equity capital decreasing.

The fractional rank of disclosure quality, as measured by DRANK, shows evidence of a positive relationship with the cost of equity capital, which is not statistically significant ( $p = 0.06$ ). This result is inconsistent with the hypothesised negative relationship and previous research. The robustness of this relationship is tested in Section 4.5, which investigates various sensitivity testing.

Overall, the model of the cost of equity capital is valid as indicated by the F-statistic of 30.75038 with a probability of  $p = 0.00000$ . The model is therefore highly statistically significant with 39.62% of the variance of the cost of equity capital explained in the model.

Dummy variables are included in the above model for the year of each observation, as with the validity testing for the cost of equity capital. By including the dummy variables the explained variation of the cost of equity capital, as measured by  $R^2$ , increased from 19.82% to 39.62%. The coefficients of all the dummy variables are highly significant, indicating that the cost of equity capital for each year in the sample is significantly different to the base year 1999.

The regression analysis was reperformed with the base year changing each time, to establish exactly which years are significantly different from each other. The following Table 7 details the regression analyses and the interpretation of the coefficients of the dummy variables with respect to the cost of equity capital.

**TABLE 7**  
**Year of Observation Dummy Variable Regression Coefficients <sup>a</sup>**

BASE YEAR	DUMMY VARIABLE				
	D99	D00	D01	D02	D03
<b>1999</b>	N/A	2.513721	1.748653	4.613765	3.170169
<i>p-value</i>		(0.0000)	(0.0001)	(0.0000)	(0.0000)
<i>Change in COE</i>		[2.513721]	[-0.765068]	[2.865112]	[-1.443596]
<b>2000</b>	-2.513721	N/A	-0.765068	2.100043	0.656448
<i>p-value</i>	(0.0000)		(0.0309)	(0.0000)	(0.1049)
<i>Change in COE</i>	[-2.513721]		[-0.765068]	[2.865111]	[-1.443595]
<b>2001</b>	-1.748653	0.765068	N/A	2.865112	1.421516
<i>p-value</i>	(0.0001)	(0.0309)		(0.0000)	(0.0004)
<i>Change in COE</i>	[-2.513721]	[2.513721]		[2.865112]	[-1.443596]
<b>2002</b>	-4.613765	-2.100043	-2.865112	N/A	-1.443596
<i>p-value</i>	(0.0000)	(0.0000)	(0.0000)		(0.0000)
<i>Change in COE</i>	[-2.513722]	[2.513722]	[-0.765069]		[-1.443596]
<b>2003</b>	-3.170169	-0.656448	-1.421516	1.443596	N/A
<i>p-value</i>	(0.0000)	(0.1049)	(0.0004)	(0.0000)	
<i>Change in COE</i>	[-2.513721]	[2.513721]	[-0.765068]	[2.865112]	

<sup>a</sup> p-values for two-tailed test of statistical significance are provided in parentheses.

The regression results in Table 7 reveal that all years are statistically significantly different from each other, except for the years 2000 and 2003 which is only significant at the 10.49% level. The coefficients reveal that on average the cost of equity capital is 2.5137% greater in 2000 than 1999; 0.7651% less in 2001 than 2000; 2.8651% greater in 2002 than 2001 and 1.4436% less in 2003 than 2002. To quantify the cumulative effect from one year to another the individual changes in COE need to be added. For example the change in COE from year 1999 to 2003 would be an increase of 3.1702% (2.513721 - 0.765068 + 2.865112 - 1.443596).

#### 4.4. EMPIRICAL ANALYSIS OF HYPOTHESIS TWO

Hypothesis two is tested by regressing cost of equity capital on fractional performance review rank, fractional financial disclosure rank, fractional forward looking rank, fractional presentation disclosure rank market beta, natural log of the market value and financial leverage as defined by the model:

$$COE_{it} = \alpha + \beta_1 BETA + \beta_2 LMVAL + \beta_3 LEV + \beta_4 PERRANK + \beta_5 FDRANK + \beta_6 FLRANK + \beta_7 PRESEN RANK \quad \text{Equation 16}$$

Where: $COE_{it}$	=	Expected cost of equity capital for firm i in year t	
BETA	=	Market beta for the firm	
LMVAL	=	Natural log of the market value	
LEV	=	Financial leverage	
PERRANK	=	Fractional performance review rank	 Categories of the total disclosure score
FDRANK	=	Fractional financial disclosure rank	
FLRANK	=	Fractional forward looking rank	
PRESEN RANK	=	Fractional presentation rank	

Hypothesis two explores the relationship between the cost of equity capital and the four categories that comprise the total disclosure score. Category one, Performance Review, includes disclosure relating to the performance of the company including any corporate governance disclosure. The Financial Disclosure category focuses on good accounting and clear and understandable reporting. The third category, forward-looking information, gives credit for forecasts that have been evaluated against the risks of the company, information regarding financial and other risks, indicators of long-term financial targets and industry and

market-related information. The final category, Presentation, focuses on layout, graphics and the readability of the annual financial statements.

Equation 16 was regressed on the total sample of 414 observations. The results revealed a negative association between cost of equity capital and financial disclosure and forward looking disclosure scores however, this was highly insignificant ( $p = 0.9686$  and  $p = 0.2939$  respectively). The ordinary least squares regression assumptions of no autocorrelation and normal residuals were also not met. The regression analysis was reperformed adjusting for the autocorrelation and eliminating the cost of equity estimate outliers, the results are provided in Table 8.

The model reveals the predicted positive relationship with beta, however this is not statistically significant. This is the same result as for hypothesis one and the test for validity of the cost of equity capital. The hypothesised negative correlation with market value and positive correlation with leverage are both significant with  $p = 0.00000$  and  $p = 0.04750$  respectively.

The relationship between the cost of equity capital and each of the four categories of the disclosure score is expected to be an inverse relationship. The results reveal a negative relationship for the financial disclosure scores, however this is not statistically significant with  $p = 0.4816$ . The association for the other three categories show a statistically insignificant positive relationship with cost of equity capital. As none of the predicted relationships are significant, no inferences can be made about the relationship between disclosure levels and the cost of equity capital.

As with hypothesis one, dummy variables have been included to represent the different years of observation. The results of the regression analysis reveal that the only years which are not statistically different from each other are years 2000 and 2001 and years 2000 and 2003.

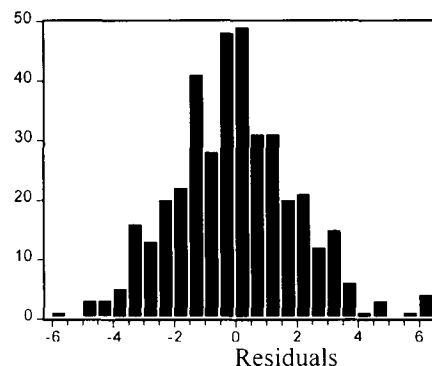
**TABLE 8**  
**Regression of COE on Beta, Market Value, Leverage and the Four Categories of the Total Disclosure Score**

$$COE_{it} = \alpha + \beta_1 BETA + \beta_2 LMVAL + \beta_3 LEV + \beta_4 PERRANK + \beta_5 FDRANK + \beta_6 FLRANK + \beta_7 PRESEN RANK + D00 + D01 + D02 + D03$$

Dependent Variable: COE  
Method: Least Squares  
Convergence achieved after 7 iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
PER_RANK	0.87593	0.66844	1.31041	0.19080
FD_RANK	-0.41750	0.59267	-0.70444	0.48160
FWD_RANK	0.32446	0.60621	0.53524	0.59280
PRES_RANK	0.88316	0.62931	1.40338	0.16130
BETA	0.25458	0.40678	0.62584	0.53180
LN_MV	-0.84501	0.12632	-6.68965	0.00000
LEV	0.05257	0.02644	1.98815	0.04750
D00	2.75779	0.27418	10.05838	0.00000
D01	2.22268	0.38428	5.78396	0.00000
D02	4.83848	0.42192	11.46786	0.00000
D03	3.35169	0.35168	9.53058	0.00000
$\alpha$	18.15911	1.86614	9.73086	0.00000
AR(1) <sup>b</sup>	0.50701	0.04477	11.32561	0.00000
R-squared	0.49415	F-statistic		31.01513
Adjusted R-squared	0.47821	Prob(F-statistic)		0.00000
S.E. of regression	2.02645			
Sum squared resid	1564.57600			

Diagnostic Tests <sup>a</sup>		t-Statistic	Prob.
Mean Independence	Mean	-1.58E-11	
White Heteroskedasticity Test	Obs*R-squared	23.23209	0.181828
Breusch-Godfrey Serial Correlation LM Test	Obs*R-squared	1.10607	0.575202
Durbin-Watson stat	Test Statistic	2.040179	
Normality of residuals			



<sup>a</sup> The above diagnostic tests reveal that there is no heteroscedasticity or autocorrelation. The residuals appear to be normally distributed as indicated by the residual histogram plot

<sup>b</sup> AR(1) function added to adjust for first order autocorrelation.

## 4.5. ALTERNATIVE TESTING

This section details various alternative tests that are carried out to ensure that the results obtained from hypothesis one and two are robust.

### 4.5.1. Simultaneity Problem

A simultaneity problem may exist when assessing the relationship between the cost of equity capital and disclosure levels. A simultaneity problem exists as when a firm considers what disclosure to provide, all the costs and benefits are taken into account. One of these costs is the cost of equity capital. In turn this study is hypothesising that the cost of equity capital is determined by the disclosure the firm provides. Therefore a circular cause and effect relationship may exist.

A two stage least squares regression analysis is applied to overcome the suggested problem. The first step is to regress the disclosure rank according to the following equation, which was used to test the validity of the disclosure scores:

$$\text{DRANK}(x) = \alpha + \beta_1 \text{RETURN} + \beta_2 \text{LMVAL} + \beta_3 \text{LEV} + \beta_4 \text{LIST} \quad \text{Equation 17}$$

The second step is to determine a predicted disclosure rank for each firm using the regression equation determined above. The predicted disclosure rank is then substituted into the main equation and regressed. The results from the regressing *Equation 18* are presented in Table 9:

$$\text{COE}_{it} = \alpha + \beta_1 \text{BETA} + \beta_2 \text{LMVAL} + \beta_3 \text{LEV} + \beta_4 \text{DRANK}(x) \quad \text{Equation 18}$$

**TABLE 9**  
**Two-Stage Regression of COE on Beta, Market Value, Leverage and Predicted Fractional Disclosure Rank**

First Stage:  $DRANK(x) = \alpha + \beta_1 RETURN + \beta_2 LMVAL + \beta_3 LEV + \beta_4 LIST$

Second Stage:  $COE_{it} = \alpha + \beta_1 BETA + \beta_2 LMVAL + \beta_3 LEV + \beta_4 DRANK(x)$

**Stage 1:**

Dependent Variable: DRANK

Method: Least Squares

Convergence achieved after 5 iterations

**Predicted regression equation**  $DRANK(x) = \alpha + (0.116441)RETURN + (0.064363)LMVAL + (0.002991)LEV + (0.091453)LIST$

**Stage 2:**

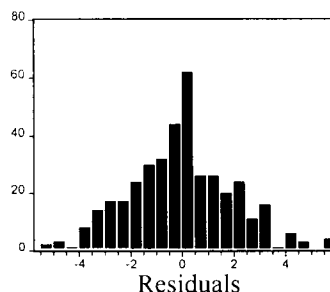
Dependent Variable: COE

Method: Least Squares

Convergence achieved after 6 iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DRANK(x)	0.93748	0.83249	1.12612	0.26080
BETA	0.23223	0.40304	0.57619	0.56480
LMVAL	-0.69531	0.11733	-5.92618	0.00000
LEV	0.05389	0.02605	2.06888	0.03920
D00	2.66567	0.28185	9.45766	0.00000
D01	2.04206	0.33139	6.16208	0.00000
D02	4.53836	0.34608	13.11368	0.00000
D03	3.16167	0.30742	10.28439	0.00000
A	16.39173	1.78147	9.20123	0.00000
AR(1) <sup>b</sup>	0.47047	0.04578	10.27680	0.00000
R-squared	0.46347	F-statistic		36.56833
Adjusted R-squared	0.45079	Prob(F-statistic)		0.00000
S.E. of regression	2.02568			
Sum squared resid	1563.38800			

Diagnostic Tests <sup>a</sup>		t-Statistic	Prob.
Mean Independence	Mean	5.54E-12	
White Heteroskedasticity Test	Obs*R-squared	17.24443	0.140632
Breusch-Godfrey Serial Correlation LM Test	Obs*R-squared	1.033166	0.596555
Durbin-Watson stat	Test Statistic	2.03932	
Normality of residuals			



<sup>a</sup> The above diagnostic tests reveal that there is no heteroscedasticity or autocorrelation. The residuals appear to be normally distributed as indicated by the residual histogram plot

<sup>b</sup> AR(1) function added to adjust for first order autocorrelation.



The first stage of the 2-stage regression was performed with the fractional disclosure rank as the dependent variable. The predicted disclosure scores were then determined from the predicted regression equation. The predicted disclosure scores were then substituted into Hypothesis One, in place of the original disclosure scores. The results indicate that the expected relationships hold for beta, market value and leverage, with market value and leverage being statistically significant. The predicted relationship between the disclosure level and the cost of equity capital is not in accordance with the forecasted negative association. This positive relationship exhibited in the model is however not statistically significant ( $p = 0.26080$ ) and therefore no conclusion can be made of the effect of disclosure on the cost of equity capital.

#### **4.5.2. Alternative Disclosure Score Measures**

Four alternative measures are used instead of the fractional disclosure ranks to test the robustness of the original regression analysis. The first is the actual disclosure scores provided by the Excellence in Financial Reporting survey. The actual disclosure scores have been standardised as a percentage of the total available as this can change year on year.

The second alternative proxy for financial disclosure level is the overall disclosure ratings disclosed in the annual Excellence in Financial Reporting survey. There are five categories in which companies may be classified, which are: top ten, excellent, good, adequate and poor in this order. The highest category, top ten, is given value of 5 and decreased to the lowest category, poor, with a value of 1.

Thirdly, the normal scores transformation method is applied to the disclosure scores. This method is an extension of the original ranking of the disclosure scores. The ranked disclosure scores are substituted by the corresponding value in the normal distribution.

The final alternative disclosure measure uses the log of the odds ratio method. The disclosure scores are transformed by taking the log of the disclosure scores divided by 1 less the disclosure score. This approach will ensure that the range of transformed disclosure scores follows the normal distribution.

Table 10 below summarises the results of the alternative disclosure measures. The regression analyses all reflect a positive relationship between disclosure levels and the cost of equity capital, however only the disclosure category measure was highly significant. This may be misleading as companies within each category are not ranked in order of merit.

The regression analyses were also performed for the four disclosure categories. Using the standardised scores an insignificant positive relationship is shown for the performance, financial disclosure and forward looking categories, while an insignificant negative relationship is shown for the presentation category. The normal scores revealed an insignificant negative relationship for both financial disclosure and forward looking information and an insignificant positive relationship for both performance and presentation disclosure scores. Using the log of the odds ratio as a proxy for disclosure scores an insignificant negative correlation was found for the performance and presentation categories, while an insignificant positive relationship was found for financial disclosure and forward looking categories.

The above alternative tests for different measures of the disclosure scores have all yielded the same statistically insignificant result as the original multiple regression of hypothesis one. As the results of all these tests are statistically insignificant, no conclusion can be reached regarding the relationship between the cost of equity capital and disclosure levels.

**TABLE 10**  
**Alternative disclosure measures <sup>a</sup>**

$$COE_{it} = \alpha + \beta_1 BETA + \beta_2 LMVAL + \beta_3 LEV + \beta_4 DISC$$

Variable	STD Disc Scores	Disc Categories	Normal Scores	Log of Odds Ratio
DISC	0.032164 (0.0661)	0.51181 (0.0092)	0.067784 (0.4422)	0.785805 (0.0455)
BETA	-0.14582 (0.8300)	-0.10221 (0.8807)	0.221322 (0.5823)	-0.136856 (0.8397)
LMVAL	-1.05143 (0.0000)	-1.10727 (0.0000)	-0.692457 (0.0000)	-1.061770 (0.0000)
LEV	0.053677 (0.2050)	0.04570 (0.2833)	0.060794 (0.0211)	0.053252 (0.2082)
D00	2.860468 (0.0000)	3.18449 (0.0000)	2.760342 (0.0000)	2.837314 (0.0000)
D01	1.761911 (0.0042)	2.30323 (0.0000)	2.200432 (0.0000)	1.727808 (0.0046)
D02	4.715429 (0.0000)	5.24868 (0.0000)	4.722667 (0.0000)	4.678657 (0.0000)
D03	3.543536 (0.0000)	3.84290 (0.0000)	3.201977 (0.0000)	3.520887 (0.0000)
$\alpha$	21.60155 (0.0000)	22.15637 (0.0000)	16.72468 (0.0000)	23.39764 (0.0000)
AR(1) <sup>b</sup>	0.379615 (0.0000)	0.38335 (0.0000)	0.488026 (0.0000)	0.382786 (0.0000)

<sup>a</sup> p-values for two-tailed test of statistical significance are provided in parentheses.

<sup>b</sup> AR(1) function added to adjust for first order autocorrelation.

#### 4.5.3. Use of Fractional Ranks for all variables

The fractional ranks of all the other variables being: the cost of equity capital, beta, market value and leverage are regressed. This is considered as in the original regression all the variables are cardinal variables except for the disclosure score, which is ranked. Table 11 depicts the results of the ranked regression.

TABLE 11

Ranked Regression Analysis <sup>a</sup>

$$\text{RANK-COE}_{it} = \alpha + \beta_1 \text{RANK-BETA} + \beta_2 \text{RANK-LMVAL} + \beta_3 \text{RANK-LEV} + \beta_4 \text{DRANK}$$

Variable	Coefficient	t-Statistic	Prob.
DRANK	0.10543	2.08516	0.03770
RANK-BETA	-0.00592	-0.12185	0.90310
RANK-LMVAL	-0.29363	-5.91489	0.00000
RANK-LEV	0.08527	1.82483	0.06880
D00	0.28486	9.34295	0.00000
D01	0.16508	4.48962	0.00000
D02	0.43368	11.51465	0.00000
D03	0.31114	9.32339	0.00000
$\alpha$	0.30282	6.39175	0.00000
AR(1) <sup>b</sup>	0.44501	9.87749	0.00000
R-squared	0.49415	F-statistic	31.01513
Adjusted R-squared	0.47821	Prob(F-statistic)	0.00000
S.E. of regression	2.02645		
Sum squared resid	1564.57600		

<sup>a</sup> The diagnostic tests for the above regression reveal that there is no heteroscedasticity or autocorrelation.

<sup>b</sup> AR(1) function added to adjust for first order autocorrelation.

The ranked regression analysis reveals a significant positive association between the cost of equity capital and the financial disclosure levels. The ranked regression was reperformed using the four components of the disclosure score indicating a negative correlation with the financial disclosure and a positive correlation with performance disclosure, forward looking disclosure and presentation disclosure, however neither are statistically significant.

#### 4.5.4. Regression analysis for each year

For each year in the sample, hypothesis one and two are regressed separately to determine if a different estimated relationship between disclosure and the cost of equity capital is exhibited. Table 12 below details the findings of both hypothesis one and two.

<b>TABLE 12</b> <b>Regression Analysis for each year<sup>a</sup></b> $COE_{it} = \alpha + \beta_1 BETA + \beta_2 LMVAL + \beta_3 LEV + \beta_4 DRANK$					
<b>Panel A: Total Disclosure Score</b>					
<b>Variable</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>
DRANK	2.719811 (0.0133)	2.664993 (0.0184)	0.765775 (0.4689)	-2.930410 (0.0354)	-1.134648 (0.2892)
BETA	-0.734268 (0.4767)	0.900007 (0.3672)	0.932832 (0.1903)	1.660210 (0.1970)	-0.167518 (0.8412)
LMVAL	-1.212750 (0.0001)	-1.133008 (0.0001)	-0.405606 (0.0840)	-0.403727 (0.1583)	-0.539049 (0.0456)
LEV	-0.021483 (0.6920)	-0.029434 (0.6074)	0.014666 (0.7128)	0.079370 (0.1487)	0.144535 (0.0164)
$\alpha$	25.32990 (0.0000)	24.82958 (0.0000)	13.39928 (0.0001)	17.84452 (0.0000)	18.11573 (0.0000)
<b>Panel B: Four Disclosure Categories</b>					
<b>Variable</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>
PER_RANK	0.480617 (0.7762)	-1.944580 (0.2547)	0.080569 (0.9523)	-1.520306 (0.4775)	3.332067 (0.0682)
FD_RANK	1.348067 (0.4386)	2.845525 (0.1404)	0.673416 (0.6238)	-1.092639 (0.5842)	-2.138737 (0.1114)
FWD_RANK	-0.874202 (0.5911)	3.599745 (0.0525)	-1.444831 (0.3137)	-2.025183 (0.2503)	-0.875965 (0.5406)
PRES_RANK	2.413928 (0.2020)	-0.497369 (0.7671)	1.239502 (0.3299)	2.761610 (0.1426)	-2.541727 (0.2020)
BETA	-0.632552 (0.5366)	0.961429 (0.3357)	0.831736 (0.2634)	1.357121 (0.2610)	-0.277004 (0.7411)
LMVAL	-1.052644 (0.0004)	-1.209640 (0.0001)	-0.318109 (0.2142)	-0.378522 (0.1483)	-0.473392 (0.0839)
LEV	-0.023525 (0.6644)	-0.021419 (0.7042)	0.012148 (0.7636)	0.082012 (0.0978)	0.131332 (0.0295)
$\alpha$	22.15865 (0.0000)	25.90993 (0.0000)	12.27955 (0.0011)	16.74127 (0.0000)	17.59895 (0.0000)

<sup>a</sup> p-values for two-tailed test of statistical significance are provided in parentheses.

For the years 1999 to 2001 a direct association is found between the cost of equity capital and disclosure levels, with a significant association for the years 1999 and 2000. In contrast to this an inverse association is found for the years 2002 to 2003, however this is only significant for the year 2002.

One possible reason for this result may be due to the increase in awareness and disclosure levels in the South African market in recent years. One possible reason for the increased emphasis of annual financial disclosure would be that the JSE has established a monitoring panel in 2002, which investigates any deviations from Statements of Generally Accepted Accounting Practice. With the introduction of King II in 2002 South African companies have also started to disclose more valuable corporate governance information which has given more valuable insight into the respective company. In more recent years the Statements of Generally Accepted Accounting Practice have been improved due to an improvements project and the harmonisation of the accounting statements internationally, which has lead to the disclosure of the fair of assets and liabilities reflecting a more accurate financial position.

The effect of the four disclosure categories displayed a variation in associations throughout the years, with no significant estimated relationship. A greater number of negative associations for the years 2002 and 2003 were experienced.

The results of this alternative test therefore appear to indicate that there is a change in the predicted relationship between the level of disclosure and the cost of equity capital from the year 2002.

#### **4.5.5. Regression Analysis according to Company Year End**

The companies included in the sample all have different year ends. A sensitivity test is performed to determine whether the timing of the year end would affect the hypothesised relationship. Companies with year ends in March, June, September and December were included in this analysis. All months with less than 20 observations were excluded as it was assumed that the residuals of the regression analysis for these months would not be normally distributed. Results in Table 13 reveal that for the months of March, June and September a positive correlation is found with the cost of equity capital, but this is not statistically significant. For the month of December a negative correlation is estimated, however this is also not significant. Therefore by taking the various year ends into account no conclusion can be reached of the relationship between the cost of equity capital and disclosure levels.

**TABLE 13**  
**Regression Analysis per company year end <sup>a</sup>**  
 $COE_{it} = \alpha + \beta_1 BETA + \beta_2 LMVAL + \beta_3 LEV + \beta_4 DRANK$

Variable	March	June	September	December
DRANK	0.98962 (0.37170)	1.58093 (0.10160)	1.57821 (0.13220)	-0.24391 (0.88990)
BETA	-0.19390 (0.84330)	-0.55028 (0.45300)	3.86973 (0.00000)	-0.24440 (0.86920)
LMVAL	-1.01396 (0.00040)	-0.57270 (0.02140)	-1.60767 (0.00000)	-0.83259 (0.02540)
LEV	0.04788 (0.23970)	0.02748 (0.81520)	0.35430 (0.00220)	0.23069 (0.04020)
D00	2.77239 (0.00000)	2.32682 (0.00030)	1.76116 (0.01470)	1.68145 (0.14170)
D01	1.67965 (0.04760)	1.09211 (0.12160)	1.52981 (0.04930)	0.61250 (0.60560)
D02	5.39352 (0.00000)	2.93326 (0.00010)	5.20934 (0.00000)	3.23124 (0.00780)
D03	3.50720 (0.00000)	1.46920 (0.03040)	3.48149 (0.00010)	3.18409 (0.01230)
$\alpha$	22.02086 (0.00000)	15.75746 (0.00000)	26.57413 (0.00000)	20.20216 (0.00020)
AR(1) <sup>b</sup>	0.45649 (0.00000)	0.24200 (0.00970)		0.44270 (0.00030)

<sup>a</sup> p-values for two-tailed test of statistical significance are provided in parentheses.  
<sup>b</sup> AR(1) function added to adjust for first order autocorrelation.

#### 4.5.6. Regression Analysis according to Industry Sector

The firms included in the sample also come from different industry sectors and this sensitivity test explored whether there is a different relationship estimated for the different industries. The different industry sectors were classified into three main categories namely; financial, industrial and mining. Table 14 depicts the results from the sensitivity test, which indicate that financial and mining firms do not display a significant association for disclosure levels. Alternatively,



industrial firms are estimated to have a significant positive association of disclosure levels with cost of equity capital.

**TABLE 14**  
**Regression Analysis per industry sector <sup>a</sup>**  
 $COE_{it} = \alpha + \beta_1 BETA + \beta_2 LMVAL + \beta_3 LEV + \beta_4 DRANK$

<b>Panel A: Total Disclosure Score</b>			
<b>Variable</b>	<b>Financial</b>	<b>Industrial</b>	<b>Mining</b>
DRANK	1.13844 (0.27660)	2.09136 (0.00020)	0.30362 (0.84970)
BETA	0.80321 (0.40190)	0.28416 (0.53830)	0.78455 (0.58620)
LMVAL	-1.17029 (0.00000)	-1.16214 (0.00000)	-0.67524 (0.06230)
LEV	0.03468 (0.32710)	-0.02695 (0.46560)	-0.22355 (0.65090)
D00	3.06104 (0.00000)	2.08203 (0.00000)	3.08785 (0.00410)
D01	2.32743 (0.00160)	1.33553 (0.00140)	1.72776 (0.15780)
D02	5.83035 (0.00000)	3.89216 (0.00000)	3.14383 (0.01220)
D03	5.12520 (0.00000)	2.73881 (0.00000)	0.70469 (0.51720)
$\alpha$	23.40436 (0.00000)	23.19696 (0.00000)	16.55874 (0.00220)
AR(1) <sup>b</sup>	0.50291 (0.00000)	0.47073 (0.00000)	0.40871 (0.00220)

<sup>a</sup> p-values for two-tailed test of statistical significance are provided in parentheses.

<sup>b</sup> AR(1) function added to adjust for first order autocorrelation.

#### 4.5.7. CAPM Estimate of the Cost of Equity Capital

The final alternative test uses the CAPM as a different estimate for the cost of equity capital. The cost of equity capital is defined as the risk free rate plus beta multiplied by the market risk premium. The model used the 91 day Treasury Bill rate as a proxy for the risk free rate in the

South African market and an average long term market risk premium of 8.47%, as found by previous research. The original hypothesis one and two were then estimated using the new estimate for the cost of equity capital. The results of the revised regression analysis are presented for both the total disclosure score and the four categories of disclosure.

**TABLE 15**  
**CAPM Regression Analysis**

$$COE_{it} = \alpha + \beta_1 BETA + \beta_2 LMVAL + \beta_3 LEV + \beta_4 DRANK$$

<b>Panel A: Total Disclosure Score</b>				
<b>Variable</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>t-Statistic</b>	<b>Prob.</b>
DRANK	0.00256	0.00175	1.46687	0.14320
BETA	0.08702	0.00151	57.59180	0.00000
LMVAL	-0.00022	0.00044	-0.49419	0.62140
LEV	0.00001	0.00008	0.13174	0.89530
$\alpha$	0.10269	0.00641	16.00977	0.00000
<b>Panel B: Four Disclosure Categories</b>				
<b>Variable</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>t-Statistic</b>	<b>Prob.</b>
PER_RANK	-0.00328	0.00285	-1.15074	0.25050
FD_RANK	0.00586	0.00208	2.81476	0.00510
FWD_RANK	-0.00343	0.00280	-1.22545	0.22110
PRES_RANK	0.00502	0.00295	1.70249	0.08940
BETA	0.08737	0.00155	56.51787	0.00000
LMVAL	-0.00008	0.00045	-0.16653	0.86780
LEV	0.00001	0.00007	0.18493	0.85340
$\alpha$	0.09937	0.00655	15.17129	0.00000
AR(1) <sup>b</sup>	-0.51259	0.04681	-10.95164	0.00000

<sup>b</sup> AR(1) function added to adjust for first order autocorrelation.

The total disclosure level reveals a positive insignificant correlation with the dependent variable, COE. When looking at the individual disclosure categories the performance and forward looking disclosure categories exhibit a negative correlation, yet these are not significant and no inferences can be made on the general relationship. A positive insignificant association is estimated for the presentation category and a significant positive association for the financial disclosure category.

#### 4.6. SUMMARY OF EMPIRICAL RESULTS

The following table summarises the findings for all the tests, indicating whether a positive or negative relationship was found. Taking all the results into account the overall conclusion is that there is no significant relationship between the level of disclosure and the cost of equity capital for the top 100 companies on the JSE Securities exchange for the years 1999 to 2003.

**TABLE 16**  
**Summary of COE Regression Analyses Results**  
 $COE_{it} = \alpha + \beta_1 BETA + \beta_2 LMVAL + \beta_3 LEV + \beta_4 DRANK$

Variable	Hypothesis 1	Hypothesis 2			
		Performance	Financial Disclosure	Forward Looking	Presentation
<b>Main Hypothesis</b>	Pos	Pos	Neg	Pos	Pos
<b>Alternative Tests</b>					
Two-stage regression	Pos				
Absolute Disclosure Scores	Pos				
Disclosure Categories	<b>Pos</b>				
Normal Scores	Pos				
Log of odds ratio	<b>Pos</b>				
Rank regression	<b>Pos</b>	Pos	Neg	Pos	Pos
<b>Observation Years</b>					
1999	<b>Pos</b>	Pos	Pos	Neg	Pos
2000	<b>Pos</b>	Neg	Pos	Pos	Neg
2001	Pos	Pos	Pos	Neg	Pos
2002	<b>Neg</b>	Neg	Neg	Neg	Pos
2003	Neg	Pos	Neg	Neg	Neg
<b>Year Ends</b>					
March	Pos				
June	Pos				
September	Pos				
December	Neg				
<b>Industry Sectors</b>					
Financial	Pos				
Industrial	<b>Pos</b>				
Mining	Pos				
<b>CAPM model</b>	Pos	Neg	<b>Pos</b>	Neg	Pos
<b>OVERALL CONCLUSION No Significant Relationship</b>					
<b>Bold type = Significant relationship found</b>					

The overall conclusions from the above findings are discussed in the following chapter.

## 5. CONCLUSION

This research investigates the nature and extent of the relationship between the level of disclosure and the cost of equity capital in the South African market for the top one hundred companies listed on the JSE Securities Exchange (JSE) for the years 1999 to 2003. Past theoretical research has found a negative relationship between these two variables. South African evidence in this study indicates that there is, on balance, no statistical grounds for indicating any such association. This conclusion is developed below.

This study utilised the disclosure scores developed by the Excellence in Financial Reporting Survey for the top 100 companies on the JSE Securities Exchange. These disclosure scores exhibit the expected positive relationship with average return on equity, firm size, leverage and listing status. Therefore the disclosure scores are a valid measure for the differential levels of disclosure and are suitable to be included in the study.

The cost of equity capital was estimated using the residual income approach. These estimates are considered to be appropriate as the estimated cost of equity capital exhibited statistically significant relationships with beta, firm size and leverage.

The first hypothesis of a negative relationship between the cost of equity capital and the disclosure levels indicate an insignificant positive relationship. This finding contradicts the findings of Botosan (1997), Richardson and Welker (2001), Botosan and Plumlee (2001) and Hail (2001), who all found a significant negative relationship which supports the hypothesised relationship. However, the finding is consistent with previous South African research performed by Negash (2001), who concluded that there is neither an increasing nor decreasing relationship between the level of disclosure and the bid-ask spread, which is a proxy for the cost of capital. This study also found that there is no significant relationship between cost of equity

capital and the four individual disclosure scores. This may indicate that South African investors and analysts do not consider increased levels of disclosure or the increased quality of information provided to reduce the specific risk of a company, which could lead to a decrease in the cost of equity capital.

The results of this study therefore suggest that hypothesis one and two do not hold and that there is no association between the level of disclosure and the cost of equity capital.

In order to establish whether the conclusions reached for hypothesis one and two are robust various alternative tests were performed. The two stage regression analysis supports the original conclusion of an insignificant positive relationship between the level of disclosure and the cost of equity capital. While the alternative tests using a range of different measures for the disclosure scores resulted in both significant and insignificant positive relationships. However the significant result for the four different disclosure categories must be interpreted with care as there are large variances in disclosure levels in each disclosure category and therefore the result may not be accurate. Therefore the results from the above alternative tests are therefore not conclusive and the insignificant relationship found for hypothesis one is reconfirmed.

The results of the alternative test which regressed the ranks of all the variables both independent and dependant contradicts the finding of hypothesis one as a significant positive relationship is found. However when the individual disclosure ranks were investigated no significant relationship was found. This reinforces the original conclusion that hypothesis two does not hold.

Analysis of hypothesis one for the different years in the sample, revealed some interesting results. For the years 1999 and 2000 a significant positive relationship was established while an insignificant positive relationship was found for 2001. The more current observation years,

2002 and 2003, revealed a negative association with a significant negative relationship for the 2002 year. These findings therefore may indicate that there has been a change in the relationship between the cost of equity capital and the level of disclosure through the sample years.

One possible reason for this change in relationship is due to the increased focus on corporate governance disclosure with the introduction of King II in 2002 and greater focus on accounting statement compliance with the introduction of the JSE GAAP monitoring panel in 2002.

The results of this study may therefore indicate that improved corporate governance and financial disclosure could reduce the perceived risk of a company. However the results of this study are not conclusive as a statistically significant relationship was only found for one observation year. This result should be further researched by observing more recent data.

The results of the analysis for the financial and mining sectors confirmed the original finding of no significant relationship between the cost of equity capital and disclosure levels. However the industrial sector exhibited a slightly significant positive relationship. Therefore it can be concluded that if the company is in the industrial sector it may influence the relationship between the cost of equity capital and the disclosure scores. This finding should however be further investigated by including more recent data sets.

Analysing hypothesis one according to different company year ends also concluded that there is no significant relationship and therefore it can be concluded that the year end of the companies does not have a significant bearing on the results of the tests.

The results of hypothesis one were also reconfirmed when the CAPM model was used to estimate the cost of equity capital as no significant relationship was found. However the results

for hypothesis two were inconsistent when using the CAPM estimates. The CAPM model resulted in a significant positive relationship for financial disclosure scores. This contradicts the hypothesised relationship and should be further investigated.

Considering all the results from the regression analyses, the overall conclusion for this study is that there is no significant relationship, either positive or negative, between the cost of equity capital and the disclosure levels for the top 100 companies on the JSE for the years 1999 to 2003. However, the results from the study have indicated that there is potentially a change in the hypothesised relationship in the South African market from 2002 onwards.

Further areas of research may consist of:

- Extending the sample to include more recent years. Thereby investigating the result found by this study that for 2002 a significant negative association was found.
- Analysing the relationship between cost of equity capital and disclosure levels per industry. This analysis could further investigate the finding that a significant positive relationship was found for the industrial sector.
- Further investigating the significant positive relationship found between the cost of equity capital and financial disclosure scores when using the CAPM model to estimate the cost of equity capital.

## REFERENCES

1. Admati, A (1985) 'A Noisy Rational Expectations Equilibrium for Multi-Asset Securities Markets' *Econometrica* 53(3), 629-658
2. Admati, A and Pfleiderer, P (1988) 'A theory of intraday patterns: Volume and price variability' *Review of Financial Studies* 1, 3-40
3. Ahmed, K (1995) 'The effect of corporate characteristics on disclosure quality in corporate annual reports: A meta-analysis' *Working Paper, Victoria University of Wellington, New Zealand*.
4. Allison, PD (1999) *Multiple Regression: A Primer* United States of America: Pine Forge Press Inc
5. Amihud, Y and Mendelson, H (1986) 'Asset Pricing and the Bid-Ask Spread' *Journal of Financial Economics* 17, 223-249
6. Arditti, F (1967) 'Risk in the Capital Market' *Working paper, University of Washington, Seattle*
7. Baiman, S and Verrecchia, R (1996) 'The relation among Capital Markets, Financial Disclosure, Production Efficiency, and Insider Trading' *Journal of Accounting Research* . 34(1), 1-22
8. Banz, R. (1981) 'The relationship between return and market value of common stocks' *Journal of Financial Economics* 9, 3-18
9. Barry, C.B, and Brown, S.J (1984) 'Differential information and the small firm effect' *Journal of Financial Economics* 13(2), 283-294
10. Bernard, VL (1995) 'The Feltham-Ohlson Framework: Implications for Empiricists' *Contemporary Accounting Research* 11(2), 733-747
11. Bhana, N (1989) 'Price Adjustments on the Johannesburg Stock Exchange for Unexpected and Dramatic News Events: an Empirical Analysis' *SA Journal of Business Management* 20(3), 119-128
12. Bhattacharya, U and Spiegel, M (1991) 'Insiders, Outsiders, and market Breakdowns' *Review of Financial Studies* 255-282
13. Bierman, H, Jr (1974) 'The Implications to Accounting of Efficient Markets and Capital Asset Pricing Model' *The Accounting Review* July, 557-62
14. Bloomfield, RJ and Wilks, TJ (2000) 'Disclosure Effects in the Laboratory: Liquidity, Depth, and the Cost of Capital' *The Accounting Review* 75(1), 13-41
15. Bodie, Z, Kane, A and Marcus, AJ (1999) *Investments* Boston: Irwin McGraw Hill
16. Botosan, C (1997) 'Disclosure level and the cost of equity capital' *The Accounting Review* 72(3), 323-350



17. Botosan, C (2000) 'Evidence that greater disclosure lowers the Cost of Equity Capital' *Journal of Applied Corporate Finance* 12(4,) 60-69
18. Botosan, C and Plumlee, M (2000) 'Disclosure level and expected equity cost of capital: an examination of analyst's rankings of corporate disclosure and alternative methods of estimating expected cost of capital' *Working Paper*
19. Botosan, C and Plumlee, M, (2000) 'Disclosure Level and the expected Cost of Equity Capital: An Examination of Analysts' rankings of Corporate Disclosure' <http://ssrn.com/abstract=208148>
20. Botosan, C and Plumlee, M (2002) 'A Re-Examination of Disclosure Level and Expected Cost of Equity Capital' *Journal of Accounting Research* 40(1), 21-40
21. Bowie, D.C. and Bradfield, D (1993) 'Improved Beta estimation on the JSE, a simulation study' *South African Journal of Business Management* 24, 118-123
22. Bradfield, D (1990) 'A note on the estimation problems caused by thin trading on the JSE' *De Ratione* 3, 22-25
23. Bradfield, D, Firer, C and Abrahams, Y (2002) 'The attractiveness of the Equity Market as signaled by the market risk premium' [http://www.cadiz.co.za/research\\_docs/X00100109.doc](http://www.cadiz.co.za/research_docs/X00100109.doc)
24. Brennan, M and Subrahmanyam, A (1996) 'Market Microstructure and Asset Pricing: On the Compensation for Illiquidity in Stock Returns' *Journal of Financial Economics* 42, 441-464
25. Brown, S, Finn, M and Hillgeist, S (2001) 'Disclosure Quality and the Probability of Informed Trade' *Working paper* [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=297371](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=297371)
26. Bushan, R (1989a) 'Collection of information about publicly traded firms: theory and evidence' *Journal of Accounting and Economics* 11, 183-207
27. Bushan, R (1989b) 'Firm characteristics and analyst following' *Journal of Accounting and Economics* 11(2-3), 255-275
28. Bushee, B and Noe, C (2000) 'Disclosure quality, institutional investors, and stock return volatility' *Journal of Accounting Research Supplement 2000*, 171-202
29. Chatterjee, S, Hadi, AS, and Price, B (2000) *Regression Analysis by Example* Canada: John Wiley & Sons Inc
30. Choi, F.D.S (1973) 'Financial Disclosure and Entry to the European Capital Market' *Journal of Accounting Research* Autumn, 75
31. Clarkson, P, Guedes, J, and Thompson, R (1996) 'On the Diversification, Observability and Measurement of Estimation Risk' *Journal of Financial and Quantitative Analysis* 69-94
32. Coles, J, Loewenstein, Suay, J (1995) 'On Equilibrium Pricing Under Parameter Uncertainty' *Journal of Financial and Quantitative Analysis* 347-364

33. Coller, M and Yohn, T (1997) 'Management Forecasts and Information Asymmetry: An Examination of Bid-Ask Spreads' *Journal of Accounting Research* 35(2), 181-191
34. Collins, D, Rozeff, M and Dhaliwal, D (1981) 'The economic determinants of the market reaction to proposed mandatory accounting changes in the oil and gas industry' *Journal of Accounting and Economics* 3(1), 37-72
35. Cooke, TE (1998) 'Regression Analysis in Accounting Disclosure Studies' *Accounting and Business Research* 28(3), 209-224
36. Copeland, T and Galai, D (1983) 'Information effects on the Bid-Ask Spread' *Journal of Finance* 1457-1469
37. Core, J.E (2001) 'A Review of the empirical disclosure literature: discussion' *Journal of Accounting and Economics* 31, 441-456
38. Damodaran, A (2001) *Corporate Finance: Theory and Practice* New York: John Wiley & Sons Inc.
39. Darrough, M and Stoughton, N (1990) 'Financial disclosure policy in an entry game' *Journal of Accounting and Economics* 12, 219-243
40. DeBono, J (1997) 'Divisional Cost of Equity Capital' *Management Accounting: Magazine for Chartered Management Accountant* 75(10), 40-42
41. Demsetz, H (1968) 'The Cost of Transacting' *Quarterly Journal of Economics* 82, 33-53
42. Dhaliwal, D.S, (1979) 'Disclosure Regulations and the Cost of Capital' *Southern Economic Journal* 785-794
43. Dhaliwal, D.S, Spicer, B.H and Vickery, D (1979) 'The Quality of Disclosure and the Cost of Capital' *Journal of Business Finance & Accounting* 6(2), 245-266
44. Diamond, D, and Verrecchia, R (1991) 'Disclosure, liquidity, and the cost of capital' *Journal of Finance* 46, 1325-1359
45. Drury, C (2004) *Management and Cost Accounting* London UK: Thompson Learning
46. Dyckman, T and Smith, A (1979) 'Financial accounting and reporting by oil and gas producing companies: a study of information effects' *Journal of Accounting and Economics* 1, 45-75
47. Easley, D, Hvidkjaer, S and O'Hara, M (2000) 'Is Information Risk a Determinant of Asset Returns' *Cornell University Working Paper*
48. Easley, D. and O'Hara, M (2002) 'Information and the Cost of Capital' Working Paper [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=300715](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=300715)
49. Edwards, E. and Bell, P (1961) *The Theory and measurement of business income* Berkley, CA: University of California Press
50. Elliot, RK and Jacobson, PD (1994) 'Costs and Benefits of Business Information Disclosure' *Accounting Horizons* 8 (4) 80-97

51. Ernst & Young (2000) *Excellence in Financial Reporting, the 2000 survey of Annual Reports by South Africa's top 100 Companies*, Ernst & Young Publication
52. Ernst & Young (2001) *Excellence in Financial Reporting, the 2001 survey of Annual Reports by South Africa's top 100 Companies*, Ernst & Young Publication
53. Ernst & Young (2002) *Excellence in Financial Reporting, the 2002 survey of Annual Reports by South Africa's top 100 Companies*, Ernst & Young Publication
54. Ernst & Young (2003) *Excellence in Financial Reporting, the 2003 survey of Annual Reports by South Africa's top 100 Companies*, Ernst & Young Publication
55. Ernst & Young (2004) *Excellence in Financial Reporting, the 2004 survey of Annual Reports by South Africa's top 100 Companies*, Ernst & Young Publication
56. Favish, SR. and Affleck-Graves, JF (2002) 'Estimating the market risk premium on the Johannesburg Stock Exchange using ex post and ex ante models' *The Investment Analysts Journal* 30(1)
57. Feltham, G. and Ohlson, J (1995) 'Valuation and clean surplus accounting for operating and financial activities' *Contemporary Accounting Research* 11(2), 689-731
58. Firer, C (1993) 'The P/E Ratio and the Cost of Equity Capital' *Investment Analyst Journal* 38, 43-47
59. Firer, C and Mcleod, H (1999) 'Equities, Bonds, Cash and Inflation: Historical performance in South Africa 1925-1998' *The Investment Analysts Journal* 50(1)
60. Firer, C and Stauton, M (2003) '102 Years of South African financial market history' *The Investment Analysts Journal* 56 (5)
61. Francis, J, Hanna, J, and Philbrick, D (1998) 'Management communications with securities analysts' *Journal of Accounting and Economics* 24, 363-394
62. Francis, J, Philbrick, D and Schipper, K (1994) 'Shareholder litigation and corporate disclosure' *Journal of Accounting Research* 32, 137-163
63. Garsombke, H.P (1976) 'The Relationship between Corporate Disclosure and Risk: a theoretical and empirical analysis' *PhD Dissertation, University of California-Los Angeles*, Ann Arbor: University Microfilms International.
64. Gebhardt, W, Lee, C, and Swaminathan, B (2001) 'Toward an Implied Cost of Capital' *Journal of Accounting Research* 135-176
65. Gietzmann, M.B and Trombetta M (2003) 'Disclosure interactions: Accounting policy choice and voluntary disclosure effects on the cost of capital' *Accounting and Business Research* 33(3), 187-205
66. Gigler, F (1994) 'Self-enforcing voluntary disclosure' *Journal of Accounting Research* 32, 224-240
67. Gleb, D, Zarowin, P (2000) 'Corporate disclosure policy and the informativeness of stock prices' *Working Paper New York University New York NY*

68. Glosten, L and Milgrom, P (1985) 'Bid, ask and transaction prices in a specialist market with heterogeneously informed traders' *Journal of Financial Economics* 14, 71-100
69. Hail, L (2001) 'The Impact of Voluntary Corporate Disclosures on the Ex ante Cost of Capital for Swiss Firms' *Working Paper University of Zurich Switzerland*
70. Haley, C.F (1972) 'Risk in the Capital Market' *Working Paper, University of Washington, Seattle*
71. Handa, P and Linn, S (1993) 'Arbitrage Pricing with Estimation Risk' *Journal of Financial Economics* (1), 81-100
72. Harris, M. and Muller, K (1999) 'The market valuation of IAS versus US-GAAP accounting measures using Form 20-F reconciliations' *Journal of Accounting and Economics* 26(1-3), 285-312
73. Healy, P, and Palepu, K (1993) 'The effect of firms' financial disclosure strategies on stock prices' *Accounting Horizons* 7(1), 11
74. Healy, P, and Palepu, K (1995) 'The challenges of investor communications: The case of CUC International, Inc.' *Journal of Financial Economics* 38, 111-140
75. Healy, P, and Palepu, K (2001) 'A review of the empirical disclosure literature' *Journal of Accounting & Economics* 31, 405-440
76. Healy, P, Hutton, A, and Palepu, K (1999) 'Stock performance and intermediation changes surrounding sustained increases in disclosure' *Contemporary Accounting Research* 16, 485-520
77. Heflin, F, Shaw, K and Wild, J (2001) 'Disclosure Quality and Market Liquidity' *Purdue University Working Paper*
78. Hirshleifer, J (1971) 'The private and social value of information and reward to incentive activity' *The American Economic Review* 61(4), 561-573
79. Holmstrom, B and Tirole, J (1993) 'Market Liquidity and Performance Monitoring' *Journal of Political Economy* 101(4), 678-709
80. Holthausen, R (1981) 'Evidence on the effect of bond covenants and management compensation contracts on the choice of accounting techniques: the case of the depreciation switch-back' *Journal of Accounting and Economics* 3(1), 73-109
81. Horngren, C.T (1957) 'Disclosure' *The Accounting Review* October, 598-604
82. Horgren, CT, Foster, G, Datar, SM and Uliana, E (1999) *Cost Accounting in South Africa: A Managerial Emphasis* South Africa: Prentice Hall South Africa (Pty) Ltd
83. Keller, G and Warrack, B (2000) *Statistics for Management and Economics* United States of America: Duxbury, Thompson Learning
84. Kim, O and Verrecchia, R.E (1994) 'Market liquidity and volume around earnings announcements' *Journal of Accounting and Economics* 17, 41-68

85. Knight, R.F. and Afleck-Graves, J.F (1985) 'Impact of disclosure requirements on the systematic risk of South African companies' *Working paper, Graduate School of Business, University of Cape Town*
86. Kochanek, R.F (1974) 'Segmental financial disclosure by diversified firms and security prices' *The Accounting Review* 44(2), 245-258
87. Kyle, A (1985) 'Continuous Auctions and Insider Trading' *Econometrica* 53, 1315-1335
88. Lakonishok, J (1993) *Is beta dead or alive? In the CAPM Controversy: Policy and Strategy Implications for Investment Management*. New York, NY: Association for Investment Management and Research
89. Lang, M, and Lundholm, R (1993) 'Cross-sectional determinants of analysts ratings of corporate disclosures' *Journal of Accounting Research* 31, 246-271
90. Lang, M, and Lundholm, R (1996) 'Corporate disclosure policy and analyst behaviour' *The Accounting Review* 71, 467-493
91. Lee, C, Mucklow, B and Rerady, M (1994) 'Spreads, Depths and the Impact of Earnings Information: An Intraday Analysis' *Review of Financial Studies* 6, 345-374
92. Leftwich, R (1981) 'Evidence of the impact of mandatory changes in accounting principles on corporate loan agreements' *Journal of Accounting and Economics* 3(1), 3-37
93. Leuz, C and Verrecchia, R (2000) 'The economic consequences of increased disclosure' *Journal of Accounting Research* 38
94. Negash, M (1990) 'On the Association Between Extent of Disclosure and Time: An Empirical Study in a Thinner Market Environment' *Doctoral Dissertation Vrije Universiteit Brussel*
95. Negash, M (1995) 'The relation between extent of disclosure and risk (a further counter evidence)' *Meditari* 92-116
96. Negash, M (2001) 'Uncertainty, cost of capital and financial disclosure: A review of the theory and some evidence' *SA Journal of Accounting Research* 15(2), 49-76
97. Newman, P and Sansing, R (1993) 'Disclosure policies with multiple users' *Journal of Accounting Research* 31, 92-112
98. Ohlsen, J.A (1979) 'On financial disclosure and the behaviour of security prices' *Journal of Accounting and Economics* 1(3), 211-232
99. Ohlsen, J.A (1995) 'Earnings, book value and dividends in Equity valuation' *Contemporary Accounting Research* 661-687
100. L. L. Ooms, A A Archer and E vd M Smit (1987). 'The Information Content of Dividends on the Johannesburg Stock Exchange' *South African Journal for Business Management* , 18( 4), 187-197.
101. Pastor, L and Stambaugh, R (2001) 'Liquidity Risk and Expected Stock Returns' *National Bureau of Economic Research Working Paper*

102. Richardson, AJ. and Welker, M (2001) 'Social disclosure, financial disclosure and the cost of equity capital' *Accounting Organizations and Society* 26, 597-616
103. Richardson, AJ., Welker, M and Hutchinson, I (1999) 'Managing capital market reactions to corporate social responsibility' *International Journal of Management Reviews* (1), 17-43
104. Ross, SA, Westerfield, RW, Jordan, BD and Firer, C (1996) *Fundamentals of Corporate Finance: South African Edition* London: Irwin
105. Scholes, M and Williams J (1977) 'Estimating Betas from Nonsynchronous Data' *Journal of Financial Economics* 5, 309-327
106. Scott, I (2001) 'The Effect of the Quality of Disclosure on the Systematic Risk of Large Listed Firms on the Johannesburg Securities Exchange' *BCom (Honours) Dissertation, University of Cape Town*
107. Sen, A and Srivastava, M (1990) *Regression Analysis: Theory, Methods and Applications* New York: Springer-Verlag
108. Sengupta, P (1998) 'Corporate Disclosure quality and the Cost of Debt' *The Accounting Review* 459-74
109. Singhvi, S and Desai, H.B (1971) 'An empirical analysis of the quality of corporate financial disclosure' *The Accounting Review* January, 129-138
110. Skinner, D.J (1994) 'Why firms voluntary disclose bad news' *Journal of Accounting Research* 32, 38-60
111. Thompson, AR and Ward, M (1995) 'The JSE as an Efficient Market: A Review' *Journal for Studies in Economics and Econometrics* 19(3), 33-63
112. van den Honert, R (1997) *Intermediate Statistical Methods for Business and Economics* South Africa: University of Cape Town Press (Pty) Ltd
113. Verrecchia, R (1983) 'Discretionary disclosure' *Journal of Accounting & Economics* 5, 137-167
114. Verrecchia, R (1990) 'Endogenous proprietary costs through firm interdependence' *Journal of Accounting and Economics* 12, 245-250
115. Verrecchia, R (1999) 'Disclosure and the cost of capital: A discussion' *Journal of Accounting and Economics* 26, 271-283
116. Wagenhofer, A (1990) 'Voluntary disclosure with a strategic opponent' *Journal of Accounting and Economics* 12, 341-363
117. Wang, J (1993) 'A Model of Intertemporal Asset Prices Under Asymmetric Information' *Review and Economic Studies* 60, 249-282
118. Welker, M (1995) 'Disclosure Policy, Information Asymmetry, and Liquidity in Equity Markets' *Contemporary Accounting Research* 11(2), 801-827